Infoteca's E-Journal

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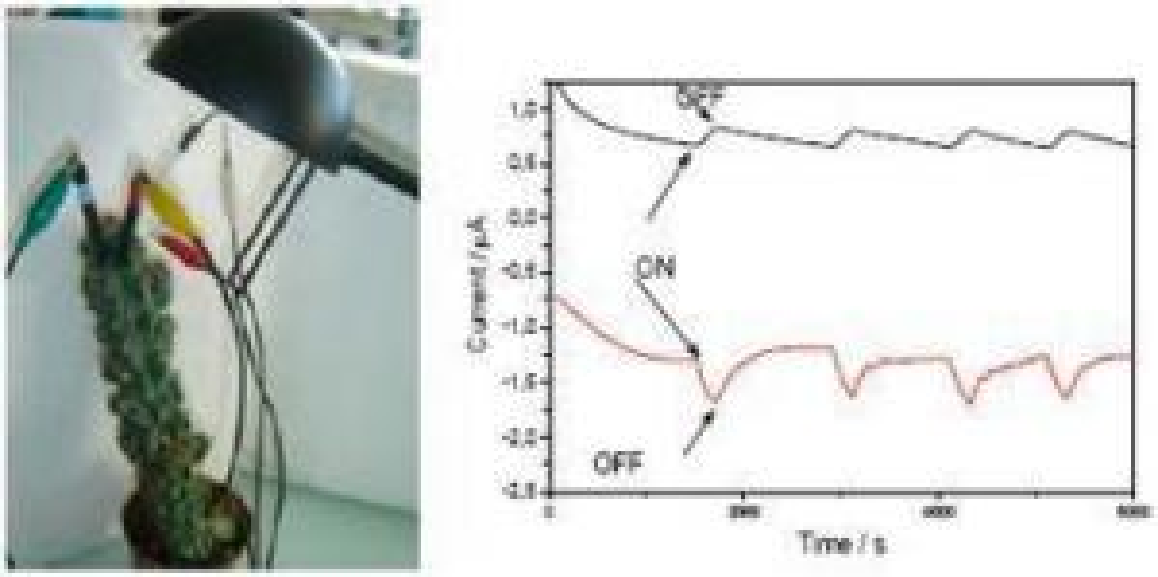
CONTENTS

A New Source of Electrical Energy? Biofuel Cell Works in Cactus



Biofuel cell inserted in a cactus and graph showing the course of electrical current as a function of illumination of the cactus (black: glucose, red: O_2).

ScienceDaily (Feb. 18, 2010) — Scientists in France have transformed the chemical energy generated by photosynthesis into electrical energy by developing a novel biofuel cell. The advance offers a new strategy to convert solar energy into electrical energy in an environmentally-friendly and renewable manner. In addition, the biofuel cell could have important medical applications.

These findings have just been published in the journal *Analytical Chemistry.*

Photosynthesis is the process by which plants convert solar energy into chemical energy. In the presence of visible light, carbon dioxide (CO_2) and water (H_20) are transformed into glucose and O_2 during a complex series of chemical reactions. Researchers at the Centre de Recherche Paul Pascal (CNRS) developed a biofuel cell that functions using the products of photosynthesis (glucose and O_2) and is made up of two enzyme-modified electrodes.

The cell was then inserted in a living plant, in this case a cactus. Once the electrodes, highly sensitive to O_2 and glucose, had been implanted in the cactus leaf, the scientists succeeded in monitoring the real-time course of photosynthesis in vivo. They were able to observe an increase in electrical current when a desk lamp was switched on, and a reduction when it was switched off.

During these experiments, the scientists were also able to make the first ever observation of the real-time course of glucose levels during photosynthesis. This method could offer a new means of better understanding the mechanisms of photosynthesis.

Furthermore, the researchers showed that a biofuel cell inserted in a cactus leaf could generate power of 9 µW per cm^2. Because this yield was proportional to light intensity, stronger illumination accelerated the production of glucose and O_2 (photosynthesis), so more fuel was available to operate the cell. In the future, this system could ultimately form the basis for a new strategy for the environmentally-friendly and renewable transformation of solar energy into electrical energy.

Alongside these results, the initial objective of this work was to develop a biofuel cell for medical applications. This could then function autonomously under the skin (in vivo), drawing chemical energy

from the oxygen-glucose couple that is naturally present in physiological fluids. It could thus provide power for implanted medical devices such as, for example, autonomous subcutaneous sensors to measure glucose levels in diabetic patients.

Story Source:

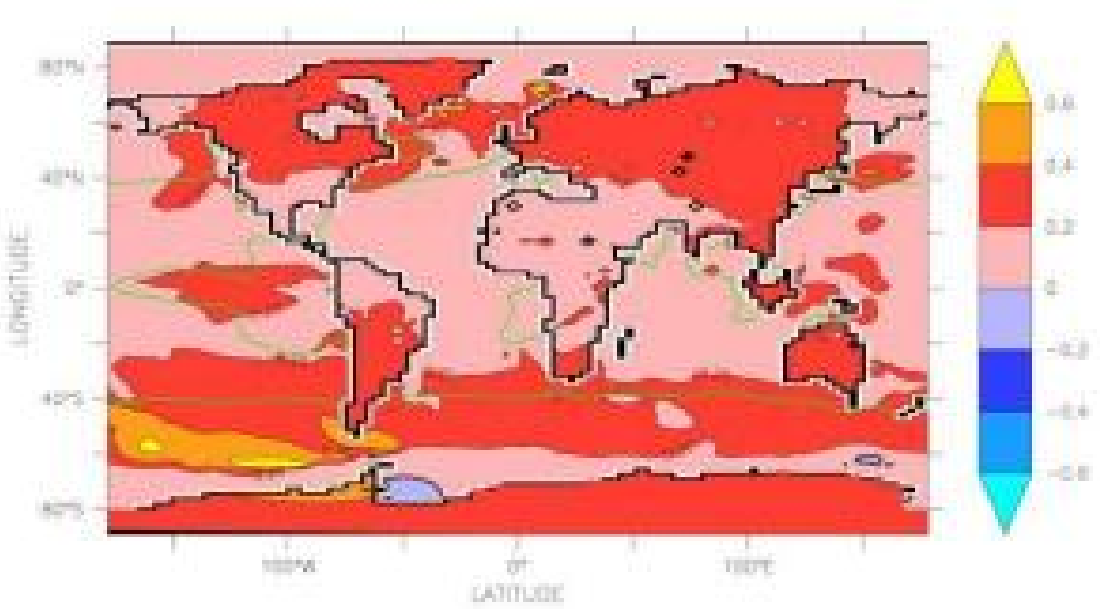
Adapted from materials provided by CNRS (Délégation Paris Michel-Ange).

Journal Reference:

1. Flexer et al. **From Dynamic Measurements of Photosynthesis in a Living Plant to Sunlight Transformation into Electricity**. *Analytical Chemistry*, 2010; 82 (4): 1444 DOI: 10.1021/ac902537h

http://www.sciencedaily.com/releases/2010/02/100218092846.htm

Ocean Geoengineering Scheme No Easy Fix for Global Warming



This map displays simulated additional surface warming (in Celsius) for the year 2100 caused by the temporary use of artificial upwelling in the green areas for the time period 2011-2060. (Credit: IFM-GEOMAR)

ScienceDaily (Feb. 18, 2010) — Pumping nutrient-rich water up from the deep ocean to boost algal growth in sunlit surface waters and draw carbon dioxide down from the atmosphere has been touted as a way of ameliorating global warming. However, a new study led by Professor Andreas Oschlies of the Leibniz Institute of Marine Sciences (IFM-GEOMAR) in Kiel, Germany, pours cold water on the idea.

"Computer simulations show that climatic benefits of the proposed geo-engineering scheme would be modest, with the potential to exacerbate global warming should it fail," said study co-author Dr Andrew Yool of the National Oceanography Centre, Southampton (NOCS).

If international governmental policies fail to reduce emissions of carbon dioxide to levels needed to keep the impacts of human-induced climate change within acceptable limits it may necessary to move to 'Plan B'. This could involve the implementation of one or more large-scale geo-engineering schemes proposed for reducing the carbon dioxide increase in the atmosphere.

One possible approach is to engineer the oceans to facilitate the long-term sequestration of carbon dioxide from the atmosphere. It has been suggested that this could be done by pumping of nutrient-rich water from a depth of several hundred metres to fertilize the growth of phytoplankton, the tiny marine algae that dominate biological production in surface waters.

The aim would be to mimic the effects of natural ocean upwelling and increase drawdown of atmospheric carbon dioxide by phytoplankton through the process of photosynthesis. Some of the sequestered carbon would be exported to the deep ocean when phytoplankton die and sink, effectively removing it from the system for hundreds or thousands of years.

A previous study, of which Yool was lead author, used an ocean general circulation model to conclude that literally hundreds of millions of pipes would be required to make a significant impact on global warming. But even if the technical and logistical difficulties of deploying the vast numbers of pipes could be overcome, exactly how much carbon dioxide could in principle be sequestered, and at what risk?

In the new study, the researchers address such questions using a more integrated model of the whole Earth system. The simulations show that, under most optimistic assumptions, three gigatons of carbon dioxide per year could be captured. This is under a tenth of the annual anthropogenic carbon dioxide emissions, which currently stand at 36 gigatons per year. A gigaton is a million million kilograms.

One surprising feature of the simulations was that the main effect occurred on land rather than the ocean. Cold water pumped to the surface cooled the atmosphere and the land surface, slowing the decomposition of organic material in soil, and ultimately resulting in about 80 per cent of the carbon dioxide sequestered being stored on land. "This remote and distributed carbon sequestration would make monitoring and verification particularly challenging," write the researchers.

More significantly, when the simulated pumps were turned off, the atmospheric carbon dioxide levels and surface temperatures rose rapidly to levels even higher than in the control simulation without artificial pumps. This finding suggests that there would be extra environmental costs to the scheme should it ever need to be turned off for unanticipated reasons.

"All models make assumptions and there remain many uncertainties, but based on our findings it is hard to see the use of artificial pumps to boost surface production as being a viable way of tackling global warming," said Yool.

Story Source:

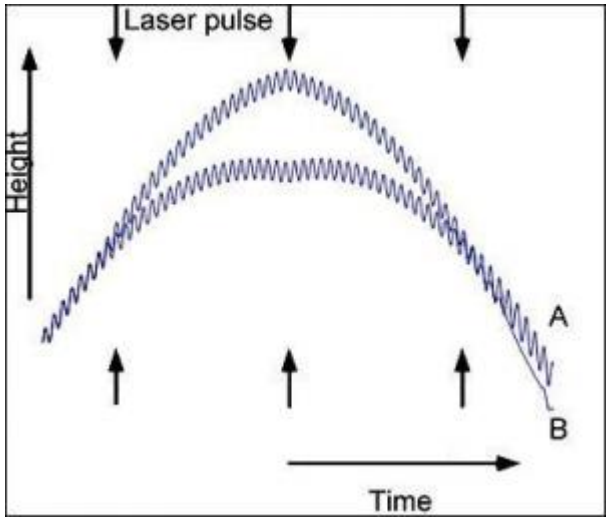
Adapted from materials provided by National Oceanography Centre, Southampton (UK).

Journal Reference:

1. Oschlies, A., M. Pahlow, A. Yool and R. J. Matear. **Climate engineering by artificial ocean upwelling: Channelling the sorcerer's apprentice**. *Geophysical Research Letters*, 2010; 37 (4): L04701 DOI: 10.1029/2009GL041961

http://www.sciencedaily.com/releases/2010/02/100216221305.htm

Atom Interferometer Provides Most Precise Test Yet of Einstein's Gravitational Redshift



Cesium atom matter waves oscillate more slowly along the lower path because the gravitational field is stronger, which means time passes more slowly. In the experiment, laser pulses kicked half the atoms 0.1 mm higher than the others; a second laser sent them on a course to merge; and a third laser measured the phase difference between the interfering matter waves. (Credit: Courtesy of Nature)

ScienceDaily (Feb. 18, 2010) — While airplane and rocket experiments have proved that gravity makes clocks tick more slowly -- a central prediction of Albert Einstein's general theory of relativity -- a new experiment in an atom interferometer measures this slowdown 10,000 times more accurately than before, and finds it to be exactly what Einstein predicted.

The result shows once again how well Einstein's theory describes the real world, said Holger Müller, an assistant professor of physics at the University of California, Berkeley.

"This experiment demonstrates that gravity changes the flow of time, a concept fundamental to the theory of general relativity," Müller said. The phenomenon is often called the gravitational redshift because the oscillations of light waves slow down or become redder when tugged by gravity.

A report describing the experiment appears in the Feb. 18 issue of the journal *Nature*.

Treating particles as waves

Müller tested Einstein's theory by taking advantage of a tenet of quantum mechanics: that matter is both a particle and a wave. The cesium atoms used in the experiment can be represented by matter waves that oscillate 3x1025 times per second, that is, 30 million billion billion times per second.

When the cesium atom matter wave enters the experiment, it encounters a carefully tuned flash of laser light. The laws of quantum mechanics step in, and each cesium atom enters two alternate realities, Müller said. In one, the laser has pushed the atom up one-tenth of a millimeter -- 4/1000 of an inch -- giving it a tiny boost out of Earth's gravitational field. In the other, the atom remains unmoved inside Earth's gravitational well, where time flies by less quickly.

While the frequency of cesium matter waves is too high to measure, Müller and his colleagues used the interference between the cesium matter waves in the alternate realities to measure the resulting difference between their oscillations, and thus the redshift.

The equations of general relativity predicted precisely the measured slowing of time, to an accuracy of about one part in 100 million (7x10-9) -- 10,000 times more accurate than the measurements made 30 years ago using two hydrogen maser clocks, one on Earth and the other launched via rocket to a height of 10,000 kilometers.

"Two of the most important theories in all of physics are Quantum Mechanics and the General Theory of Relativity," noted Müller's collaborator, Steven Chu, a former UC Berkeley professor of physics and

former director of Lawrence Berkeley National Laboratory (LBNL). Chu was one of the originators of the atom interferometer, which is based on his Nobel Prize-winning development of cold laser traps. "The paper that we are publishing in Nature uses two fundamental aspects of the quantum description of matter to perform one of the most precise tests of The General Theory of Relativity."

Precision timekeeping

Far from merely theoretical, the results have implications for Earth's global positioning satellite system, for precision timekeeping and for gravitational wave detectors, Müller said.

"If we used our best clocks, with 17-digit precision, in global positioning satellites, we could determine position to the millimeter," he said. "But lifting a clock by 1 meter creates a change in the 16th digit. So, as we use better and better clocks, we need to know the influence of gravity better."

Müller also noted that the experiment demonstrates very clearly "Einstein's profound insight, that gravity is a manifestation of curved space and time, which is among the greatest discoveries of humankind."

This insight means that what we think of as the influence of gravity -- planets orbiting stars, for example, or an apple falling to Earth -- is really matter following the quickest path through spacetime. In a flat geometry, the quickest route is a straight line. But in Einstein's theory, the flow of time becomes a function of location, so the quickest path could now be an elliptical orbit or a plumb line to the ground.

Experiments have tested the theory to higher and higher precision, but direct measurements of the gravitational redshift have had to struggle with the minimal size of the effect in Earth's gravitational field. These measurements culminated in the 1976 experiment by NASA and the Harvard Smithsonian Astrophysical Observatory using hydrogen maser clocks. That precision was 7x10-5.

Atom interferometers

Just as an optical interferometer uses interfering light waves to measure time or distance to within to a fraction of a wavelength, an atom interferometer uses interfering matter waves. Because matter waves oscillate at a much higher frequency than light waves, they can be used to measure correspondingly smaller times and distances.

Since 1991, when Chu was at Stanford University, he and former members of his lab have used Chu's technique of cooling and trapping atoms with lasers to build the most precise atom interferometers. In 1999, one of those students, Achim Peters, now at Humboldt University in Berlin, performed such an experiment on cesium atoms in free fall to precisely measure the acceleration of gravity.

Müller, who was Peters' graduate student at Humboldt University, subsequently worked in Steve Chu's group at Stanford as a postdoctoral fellow, although Chu left Stanford during that time to become the director of LBNL and later U.S. Secretary of Energy. After joining the UC Berkeley faculty in July 2008, Müller attended a conference on frequency and time measurement where he realized that Peters' experimental data could also yield the most precise measure yet of the gravitational redshift. Müller approached Chu about the experiment and received an enthusiastic response.

Peters' experiment involved capturing a million cesium atoms in a cold laser trap chilled to a few millionths of a degree above absolute zero and zapping them with a vertical laser beam tuned to give them a kick upwards, with 50 percent probability. A split second later, a second laser pulse sends the high-flying matter waves downward and the stationary ones upward to merge. A third laser pulse recombines the two. Measuring the amplitude of the recombined matter waves reveals the phase difference between the two.

Müller and Chu noted that the contribution of the rest mass to the frequency of matter wave oscillations is normally ignored in quantum mechanical calculations, because the resulting frequencies are too fast to measure. But in this experiment, that high "Compton" frequency allowed an extremely precise measurement of the different clock rates.

"In conceiving of this research, we realized that relativity theory demands that the energy E also includes the energy due to the rest mass of the atom, given by Einstein's famous equation E = mc2," Chu wrote in an e-mail. "The energy due to the rest mass of the atoms is enormous, resulting in an atomic clock that ticks at 3x1025 Hertz."

Freefall

During the approximately 0.3 seconds of freefall, the matter waves on the higher route feel that a little more time elapsed: just 2x10-20 seconds compared to the lower route. But because of the sheer magnitude of the Compton frequency, Müller said, they oscillated about a million times more often. Since the atom interferometer could measure the difference to within a thousandth of an oscillation, the experiment produced a 9-digit accuracy. This corresponds to measuring the time difference to 10-28 seconds.

To put these numbers in perspective, Müller said, "if the time of freefall was extended to the age of the universe, 14 billion years, the time difference between the upper and lower routes would be a mere 1/100th second, and the accuracy of the measurement would be 60 picoseconds, the time it takes for light to travel about 1/2 inch."

Müller is building ever more precise atom interferometers, and hopes this year to measure the gravitational redshift more precisely with a millimeter separation. One future milestone will be a separation of a meter or more.

"If we could separate the atoms by a meter, we could build an experiment to observe gravity waves," he said. Gravity waves are tiny fluctuations in gravity propagating through spacetime theoretically generated by interactions between massive stars or black holes.

To filter out noise from Earth's gravity and other perturbations, like a passing truck, such an experiment would have to involve at least two atom interferometers separated by a large distance. An ideal spot for the experiment, he said, would be the Deep Underground Science and Engineering Laboratory at the former Homestake mine in South Dakota.

The research is supported by National Science Foundation, the U.S. Air Force Office of Scientific Research, the David and Lucile Packard Foundation, and the National Institute of Standards and Technology.

Story Source:

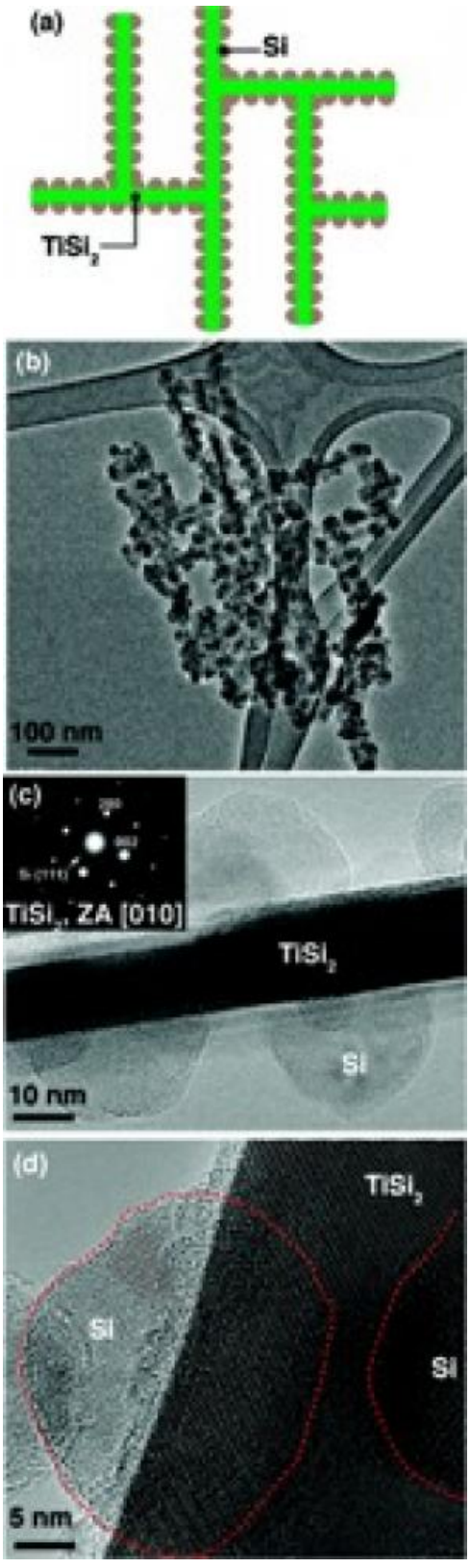
Adapted from materials provided by University of California - Berkeley.

Journal Reference:

1. Müller et al. **A precision measurement of the gravitational redshift by the interference of matter waves**. *Nature*, 2010; 463 (7283): 926 DOI: 10.1038/nature08776

http://www.sciencedaily.com/releases/2010/02/100217131125.htm

Silicon-Coated Nanonets Could Build a Better Lithium-Ion Battery



Frame (a) shows a schematic of the Nanonet, a lattice structure of Titanium disilicide (TiSi2), coated with silicon (Si) particles to form the active component for Lithium-ion storage. (b) A microscopic view of the silicon coating on the Nanonets. (c) Shows the crystallinity of the Nanonet core and the Si coating. (d) The crystallinity of TiSi2 and Si (highlighted by the dotted red line) is shown in this lattice-resolved image from transmission electron microscopy. (Credit: Nano Letters)

ScienceDaily (Feb. 18, 2010) — A tiny scaffold-like titanium structure of Nanonets coated with silicon particles could pave the way for faster, lighter and longer-lasting Lithium-ion batteries, according to a team of Boston College chemists who developed the new anode material using nanotechnology.

The web-like Nanonets developed in the lab of Boston College Assistant Professor of Chemistry Dunwei Wang offer a unique structural strength, more surface area and greater conductivity, which produced a charge/re-charge rate five to 10 times greater than typical Lithium-ion anode material, a common component in batteries for a range of consumer electronics, according to findings published in the current online edition of the American Chemical Society journal *Nano Letters*.

In addition, the Nanonets proved exceptionally durable, showing a negligible drop-off in capacity during charge and re-charge cycles. The researchers observed an average of 0.1% capacity fade per cycle between the 20th and the 100th cycles.

"As researchers pursue the next generation of re-chargeable Lithium-ion battery technology, a premium has been placed on increased power and a greater battery life span," said Wang. "In that context, the Nanonet device makes a giant leap toward those two goals and gives us a superior anode material."

Lithium-ion batteries are commonly used in consumer electronics devices. This type of rechargeable battery allows Lithium ions to move from the anode electrode to the cathode when in use. When charged, the ions move from cathode back to the anode.

The structure and conductivity of the Nanonets improved the ability to insert and extract Lithium ions from the particulate Silicon coating, the team reported. Running at a charge/discharge rate of 8,400 milliamps per gram (mA/g) -- which is approximately five to 10 times greater than similar devices -- the specific capacity of the

material was greater than 1,000 milliamps-hour per gram (mA-h/g). Typically, laptop Lithium-ion batteries are rated anywhere between 4,000 and 12,000 mA/h, meaning it would only take between four and 12 grams of the Nanonet anode material to achieve similar capacity.

Wang said the capability to preserve the crystalline Titanium Silicon core during the charge/discharge process was the key to achieving the high performance of the Nanonet anode material. Additional research in his lab will examine the performance of the Nanonet as a cathode material.

Story Source:

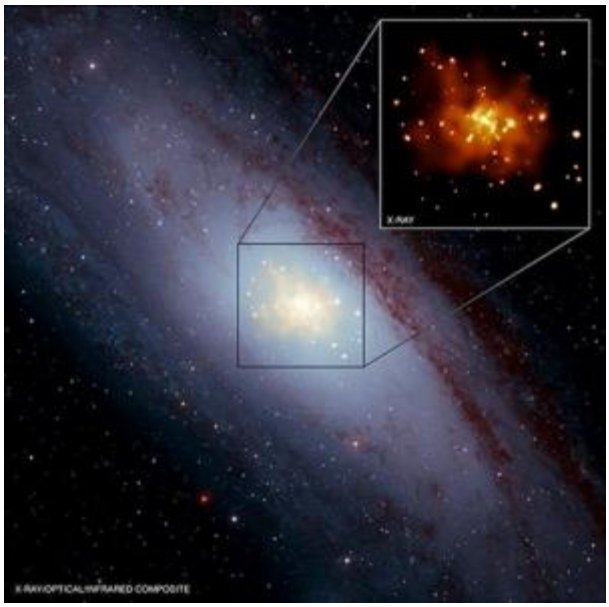
Adapted from materials provided by Boston College.

Journal Reference:

1. Zhou et al. **Si/TiSi2 Heteronanostructures as High-Capacity Anode Material for Li Ion Batteries**. *Nano Letters*, 2010; 100211141619040 DOI: 10.1021/nl903345f

http://www.sciencedaily.com/releases/2010/02/100216101157.htm

NASA's Chandra Reveals Origin of Key Cosmic Explosions



Composite image of M31, also known as the Andromeda galaxy. (Credit: X-ray: NASA/CXC/MPA/ M.Gilfanov & A.Bogdan; Infrared: NASA/JPL-Caltech/ SSC; Optical: DSS)

ScienceDaily (Feb. 18, 2010) — New findings from NASA's Chandra X-ray Observatory have provided a major advance in understanding a type of supernova critical for studying the dark energy that astronomers think pervades the universe. The results show mergers of two dense stellar remnants are the likely cause of many of the supernovae that have been used to measure the accelerated expansion of the universe.

These supernovae, called Type 1a, serve as cosmic mile markers to measure expansion of the universe because they can be seen at large distances, and they follow a reliable pattern of brightness. However, until now, scientists have been unsure what actually causes the explosions.

"These are such critical objects in understanding the universe," said Marat Gilfanov of the Max PlanckInstitute for Astrophysics in Germany and lead author of the study that appears in the Feb. 18 edition of the journal Nature. "It was a major embarrassment that we did not know how they worked. Now we are beginning to understand what lights the fuse of these explosions."

Most scientists agree a Type 1a supernova occurs when a white dwarf star -- a collapsed remnant of an elderly star -- exceeds its weight limit, becomes unstable and explodes. Scientists have identified two main possibilities for pushing the white dwarf over the edge: two white dwarfs merging or accretion, a process in which the white dwarf pulls material from a sun-like companion star until it exceeds its weight limit.

"Our results suggest the supernovae in the galaxies we studied almost all come from two white dwarfs merging," said co-author Akos Bogdan, also of Max Planck. "This is probably not what many astronomers would expect."

The difference between these two scenarios may have implications for how these supernovae can be used as "standard candles" -- objects of a known brightness -- to track vast cosmic distances. Because white dwarfs can come in a range of masses, the merger of two could result in explosions that vary somewhat in brightness.

Because these two scenarios would generate different amounts of X-ray emission, Gilfanov and Bogdan used Chandra to observe five nearby elliptical galaxies and the central region of the Andromeda galaxy. A Type 1a supernova caused by accreting material produces significant X-ray emission prior to the explosion. A supernova from a merger of two white dwarfs, on the other hand, would create significantly less X-ray emission than the accretion scenario.

The scientists found the observed X-ray emission was a factor of 30 to 50 times smaller than expected from the accretion scenario, effectively ruling it out. This implies that white dwarf mergers dominate in these galaxies.

An open question remains whether these white dwarf mergers are the primary catalyst for Type 1a supernovae in spiral galaxies. Further studies are required to know if supernovae in spiral galaxies are caused by mergers or a mixture of the two processes. Another intriguing consequence of this result is that a pair of white dwarfs is relatively hard to spot, even with the best telescopes.

"To many astrophysicists, the merger scenario seemed to be less likely because too few double-white-dwarf systems appeared to exist," said Gilfanov. "Now this path to supernovae will have to be investigated in more detail."

In addition to the X-rays observed with Chandra, other data critical for this result came from NASA's Spitzer Space Telescope and the ground-based, infrared Two Micron All Sky Survey. The infrared brightness of the galaxies allowed the team to estimate how many supernovae should occur.

NASA's Marshall Space Flight Center in Huntsville, Ala., manages the Chandra program for NASA's Science Mission Directorate in Washington. The Smithsonian Astrophysical Observatory controls Chandra's science and flight operations from Cambridge, Mass.

More information, including images and other multimedia, can be found at: http://chandra.harvard.edu and http://chandra.nasa.gov

Story Source:

Adapted from materials provided by NASA.

http://www.sciencedaily.com/releases/2010/02/100217142117.htm

Pan-Frying Meat With Gas May Be Worse Than Electricity for Raising Cancer Risk

Frying meat on a gas hob may be more harmful to health than using an electric hob, because of the type of fumes it produces, suggests new research. (Credit: iStockphoto)

ScienceDaily (Feb. 18, 2010) — Frying meat on a gas burner may be more harmful to health than using an electric burner, because of the type of fumes it produces, suggests research published ahead of print in *Occupational and Environmental Medicine*.

Professional chefs and cooks may be particularly at risk.

Cooking fumes produced during high temperature frying have recently been classified as "probably carcinogenic" by the International Agency for Research on Cancer (IARC).

Potentially harmful polycyclic aromatic hydrocarbons or PAHs for short, heterocyclic amines, and higher and mutagenic aldehydes, along with fine and ultrafine particles, have all been found in cooking fumes, using vegetable oils, such as safflower, soya bean, and rapeseed oils, as well as lard.

But it is not clear if the energy source or the type of fat used for cooking have any impact on fume content.

The research team simulated the conditions found in a typical Western European restaurant kitchen, frying 17 pieces of steak, weighing 400 g each, for 15 minutes.

They used either margarine or two different brands of soya bean oil to cook the steak on gas and electric burners. The margarine contained a blend of soya bean, rapeseed, coconut and palm oils as well as vitamins A and D, but no hydrogenated fats.

They measured the amount of PAH, aldehydes, and total particulate matter produced in the breathing zone of the cook.

Napthalene -- a banned chemical contained in traditional mothballs -- was the only PAH detected and ranged from 0.15 to 0.27 ug/m^3 air in 16 of the 17 meat samples. The highest levels were produced when frying with margarine on the gas burner.

Higher aldehydes were produced during the frying of all the samples, while mutagenic aldehydes were produced for most samples.

Overall levels ranged from undetectable to 61.80 ug/m^3 air, but the highest levels were found when frying on the gas burner, irrespective of the type of fat used.

The peak number of ultrafine particles during frying on the gas burner was considerably higher than when cooking with electricity. Particle size with gas was 40 to 60 nm compared with 80 to 100 nm with electricity. Ultrafine particles are more readily absorbed into the lung.

The authors point out that the levels of PAHs and particulate matter found during this study were below accepted occupational safety thresholds. But they add that cooking fumes contain various other harmful components for which there is as yet no clear safety threshold, and gas cooking seems to increase exposure to these components.

"Exposure to cooking fumes should be reduced as much as possible," they caution.

Story Source:

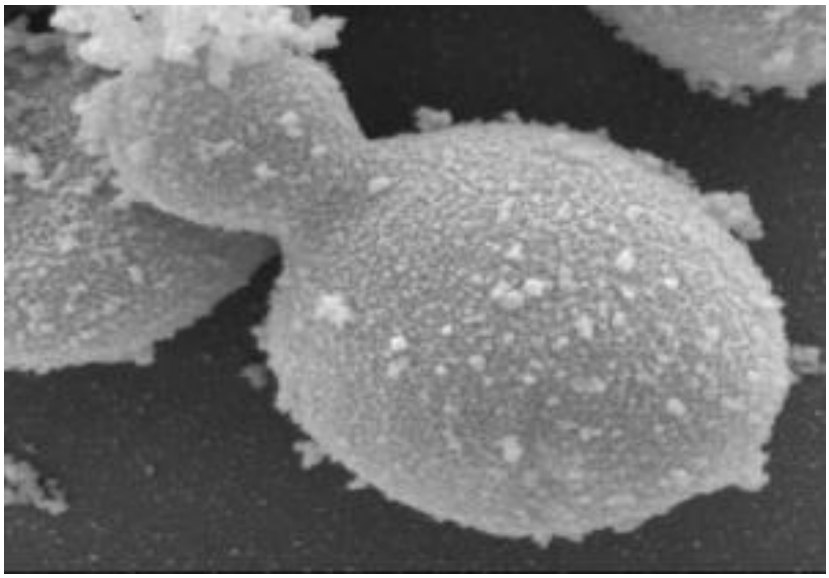
Adapted from materials provided by BMJ-British Medical Journal, via EurekAlert!, a service of AAAS.

Journal Reference:

1. Ann Kristin Sjaastad, Rikke Bramming Jørgensen, Kristin Svendsen. **Exposure to polycyclic aromatic hydrocarbons (PAHs), mutagenic aldehydes and particulate matter during pan frying of beefsteak**. *Occupational and Environmental Medicine*, 2010; DOI: 10.1136/oem.2009.046144

http://www.sciencedaily.com/releases/2010/02/100217224239.htm

New Type of Genetic Variation Could Strengthen Natural Selection



Scanning electrograph image of Saccharomyces cerevisiae. (Credit: Image courtesy of NASA)

ScienceDaily (Feb. 18, 2010) — The unexpected discovery of a new type of genetic variation suggests that natural selection -- the force that drives evolution -- is both more powerful and more complex than scientists have thought.

"We have discovered that natural selection can act not only on whole organisms and individual genes, but also on gene networks," says Antonis Rokas, assistant professor of biological sciences at Vanderbilt University and senior author of the paper reporting the discovery that was published in the February 18 issue of the journal *Nature.*

This finding may help explain how some organisms, including bacterial pathogens, maintain high levels of diversity and adapt rapidly to new stresses.

Working with colleagues at the University of Colorado School of Medicine (UCSM) and the Universidade Nova de Lisboa in Portugal, Rokas found that a close relative of brewer's yeast, *Saccharomyces kudriavzevii*, exists in two very different states: one that can efficiently digest the sugar galactose and one that cannot. Galactose is a natural sugar found in milk and many fruits and legumes. The variant found in Portugal that consumes galactose uses a network of six genes to convert the sugar into energy. What is surprising is the fact that a variant found in Japan that cannot process galactose has nevertheless preserved a non-functional version of the network of galactose genes for millions of years.

"This level of genetic divergence is normal between distantly related species, like human and mouse. Instead, we find it being maintained within a single species of yeast," says coauthor Mark Johnston from UCSM.

Normally, natural selection and recombination work jointly within an individual species to actively maintain a single version of the genes that perform critical functions or that give organisms a competitive advantage. However, this has not happened with the galactose genes in *S. kudriavzevii*. When the scientists compared the genomes of the Japanese and Portuguese populations of the yeast, they were surprised to find that the divergence between the galactose genes was a hundred times greater than the divergence between the two genomes as a whole. This indicates that the two states have co-existed for millions of years, which the scientists conclude is convincing evidence that the two have been actively maintained by natural selection.

There is one type of natural selection, called balancing selection, which actively maintains different versions of an individual gene in the a gene pool of a population. The classic example is sickle cell anemia. Individuals who inherit the sickle cell variant of the hemoglobin gene from both parents have impaired red blood cells and shortened life expectancy. However, those who receive a sickle cell gene and a normal hemoglobin gene have an increased resistance to the parasite that carries malaria, giving them an advantage wherever malaria is present.

"All the cases of balancing selection that have been identified so far, like sickle cell anemia, involve a single gene," says Rokas. "What is unusual about our case is that we are talking about a network of genes, one that is dispersed throughout the yeast genome."

A number of scientists are looking for examples of balancing selection, but they are focused on single genes. Until researchers begin looking for this type of selection, it is not possible to determine whether it is a rarity or a fundamental process.

One place to look for this new form of selection is among pathogens, many of which have lifestyles very similar to that of yeast: They have very large populations and self-fertilize most of the time, reserving sexual reproduction for periods of high stress. Selection acts most powerfully in large populations and self-mating makes it easier to maintain alternative states that are difficult to sustain.

Specific candidates are the single-cell parasites that cause malaria and the tropical skin disease leishmaniasis. "This is exactly the type of life cycle that we expect to allow for the maintenance of this type of complex genetic variation," says coauthor Chris Todd Hittinger from UCSM.

If this new type of selection is providing a competitive advantage to even one human pathogen, identifying it could prove important. "We are currently in a war with pathogens and we are loosing the battle. So every advantage we can get in understanding how pathogens adapt could be significant," says Rokas.

Additional authors of the study are Paula Conçalves and José Paulo Sampaio from the Universidade Nova de Lisboa and Jim Dover from UCSM. The research was funded by grants from the James S. McDonnell Foundation, the National Institutes of Health, the Helen Hay Whitney Foundation, the Searle Scholars Program, the National Science Foundation and Vanderbilt University.

Story Source:

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

http://www.sciencedaily.com/releases/2010/02/100217131132.htm

Stillbirths Drop Dramatically After Newborn-Care Training in Developing Countries

New findings in a study led by the director of the University of Alabama at Birmingham (UAB) Division of Neonatology show that that training birth attendants in essential newborn-care techniques reduced stillbirths by more than 30 percent - and potentially could save as many as 1 million lives worldwide each year. (Credit: UAB)

ScienceDaily (Feb. 18, 2010) — The rate of stillbirths in rural areas of six developing countries fell more than 30 percent following a basic training program in newborn care for birth attendants, according to a study funded by the National Institutes of Health and the Bill and Melinda Gates Foundation. The study tracked more than 120,000 births.

The study tested the efficacy of a three-day Essential Newborn Care training regimen that covers basic newborn care techniques, the importance of early breastfeeding, how to keep infants warm and dry, and signs of serious health problems.

The study, the largest of its kind, is one of the first to track the rate of infant deaths following the implementation of such a regimen. The World Health Organization (WHO) estimates that, in addition to more than 3 million stillbirths worldwide each year, nearly 4 million infants die in their first month of life.

The results appear in the Feb. 21 issue of The *New England Journal of Medicine*.

"These findings suggest that a low-cost instructional regimen for birth attendants can be effective in reducing stillbirths in parts of the world where most births are not attended by a physician," said Alan E. Guttmacher, M.D., acting director of the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD), the NIH institute, that, along with the Bill and Melinda Gates Foundation, funded the study.

The research was conducted at study sites in Argentina, the Democratic Republic of Congo, Guatemala, India, Pakistan, and Zambia as part of the Global Network for Women's and Children's Health Research. The network is a partnership of the NICHD and the Bill and Melinda Gates Foundation.

Waldemar A. Carlo, M.D., of the University of Alabama at Birmingham, led the research team. The study's senior author was Linda L. Wright, M.D., scientific director of the NICHD Global Network for Women's and Children's Health Research.

Before data collection on births began, research staff taught local health care workers how to collect data, assess infant health, and diagnose stillbirth and other conditions. In addition, the researchers provided local health care workers with scales to accurately measure birth weight, hand-held pumps and masks to fill babies' lungs with air, and clean-delivery kits to prevent infection.

One health care worker from each of the participating countries traveled to the United States to learn essential newborn care techniques. That person returned home to train other trainers, with the training ultimately reaching 3,600 health care workers in rural communities -- physicians, nurses, midwives, and birth attendants with no formal training.

Coordinators and attendants collected data on the births in their communities. In 99.2 percent of cases, they also documented whether babies were alive after one week. The researchers then compared statistics before and after the emergency newborn care training.

The study authors found that the overall rate of infant death during the first 7 days of life did not change among infants who had been administered the essential newborn care regimen. However, the rate of stillbirths dropped sharply -- from 23 per 1,000 deliveries to 15.9 per 1,000. The researchers believe these improvements were seen in infants who had not drawn a breath on their own and would have been considered to have been born dead by birth attendants who had not received the early newborn care training.

"The reduction in stillbirth is extremely encouraging," Dr. Carlo said. "Stillbirths among births attended by midwives and traditional birth attendants declined to nearly the same levels seen among births attended by physicians."

Dr. Carlo explained that many infants do not take a breath when they are first born. In the majority of these cases, some kind of stimulation -- rubbing the back or tapping the soles of the feet -- will start the baby breathing on its own. Other infants need air pushed into their lungs. Birth attendants without training in recognizing and resuscitating newborns who do not breathe at birth may consider the babies to be stillborn and not attempt to revive them. The researchers found a decrease in the rates of fresh stillbirth -- or death immediately before or at the moment of birth. The study did not find a decrease in macerated stillbirths -- those assumed to have died before the beginning of labor.

The study authors concluded that the essential newborn care training was most effective in providing attendants needed skills and expertise in newborn resuscitation. The greatest decrease in stillbirth rates was among deliveries attended by nurses, midwives, and traditional attendants, all of whom, the researchers believe, would likely not have received such training.

"Our results show that training in essential newborn care can play a role in improving birth outcomes in the developing world," Dr. Wright said.

In a subsequent phase of the study, trainers led in-depth sessions focused exclusively on neonatal resuscitation techniques in 88 randomly selected communities, where attendants had already undergone the ENC program. The researchers found this additional training did not further reduce infant mortality from stillbirth or other causes.

Story Source:

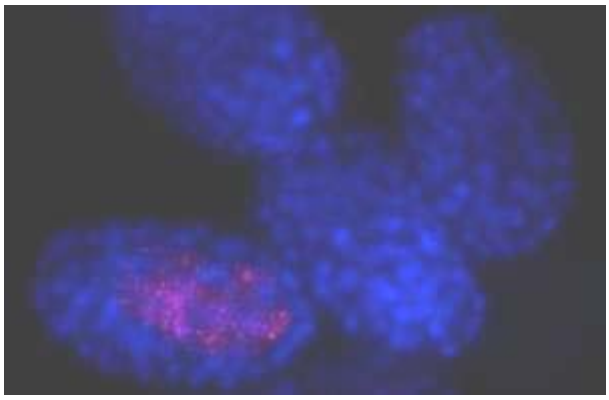
Adapted from materials provided by NIH/National Institute of Child Health and Human Development.

Journal Reference:

1. Carlo et al. **Newborn-Care Training and Perinatal Mortality in Developing Countries**. *New England Journal of Medicine*, 2010; 362 (7): 614 DOI: 10.1056/NEJMsa0806033

http://www.sciencedaily.com/releases/2010/02/100217171919.htm

Random Fluctuations Give Rise to Odd Genetic Phenomenon



Despite identical genes and a shared environment, only some mutant nematode embryos develop a gut, which appears violet in this photomicrograph. (Credit: Arjun Raj and Scott Rifkin)

ScienceDaily (Feb. 18, 2010) — For years, biologists have wondered how it is possible that not every person who carries a mutated gene expresses the trait or condition associated with the mutation. This common but poorly understood phenomenon, known as incomplete penetrance, exists in a wide range of organisms, including humans.

Many mutations in genes that are linked to diseases, including Parkinson's disease and Type 1 diabetes, are incompletely penetrant. Some of this variation may be due to environmental factors and the influence of other genes, but not all: It has been shown that genetically identical organisms living in the same environment can show variability in some incompletely penetrant traits.

Now, a team of MIT biophysicists has demonstrated that some cases of incomplete penetrance are controlled by random fluctuations in gene expression.

"It's not just nature or nurture," says Alexander van Oudenaarden, leader of the research team and a professor of physics and biology at MIT. "There is a random component to this. Molecules bounce around and find each other probabilistically. It doesn't work like clockwork."

In a study of intestinal development of *C. elegans*, a small worm, the team was able to pinpoint specific fluctuations that appear to determine whether the mutant trait is expressed or not.

The work, published in *Nature* on Feb. 18, may also be relevant to human diseases that display incomplete penetrance, such as Parkinson's disease and Type 1 diabetes, says van Oudenaarden. For example, knowing the specific points in cellular pathways that are most important in controlling a cell's response to mutation could give drug designers better targets for new therapies.

The team studied the embryonic development of the digestive tract of *C. elegans*. The tract starts out as a single cell and eventually becomes 20 cells in the adult worm. That process is initiated by a gene called skn-1, which activates a series of other genes. Most of those genes code for transcription factors, which bind to DNA and turn on additional genes.

The team first characterized normal progression of intestine development, using a probe the team members developed that binds to messenger RNA inside cells, allowing them to count the number of copies of a particular messenger RNA sequence. (Messenger RNA carries DNA's instructions to the cell's protein-building machinery.)

They then studied worms with a mutation in skn-1, and found that some of the worms developed normal digestive tracts while others failed to develop a digestive tract. It appears that the controlling factor is the

number of copies of mRNA produced by a gene called end-1, one of the genes activated by skn-1. The number of end-1 mRNA strands varied greatly in embryos with the mutation: In those with a number above a certain threshold, development proceeded normally; if the number was below the threshold, no digestive tract developed.

It appears that evolution has produced networks of genes that smooth out the effects of those fluctuations, which are revealed only when there is a mutation in the pathway, says van Oudenaarden.

Van Oudenaarden plans to use the same technique to study mammalian colon stem cells, in hopes of figuring out whether random fluctuations in gene expression influence the mutations that can cause cancer. If he can show that random fluctuations in a particular gene appear to be subject to the same threshold effect that he saw in *C. elegans* embryonic development, it could give drug designers new targets.

Story Source:

Adapted from materials provided by Massachusetts Institute of Technology.

Journal Reference:

1. Arjun Raj, Scott Rifkin, Erik Andersen, Alexander van Oudenaarden. **Variability in gene expression underlies incomplete penetrance**. *Nature*, February 18, 2010 DOI: 10.1038/nature08781

http://www.sciencedaily.com/releases/2010/02/100217131121.htm

Has This Library Solved "The Mystery Of The Mummy Paper?"

Reality or urban legend: were the wrappings of ancient Egyptian corpses recycled and pulped to create so-called "mummy paper?" Archaeologists and other scholars have long debated the veracity of claims that mummies were imported into the U.S. in the mid-nineteenth century, stripped of their burial shrouds, and their bindings (largely composed of linen and other fibers such as papyrus and something akin to canvas) repurposed into printing paper. But, did this really happen? Are we being fleeced? Is this a fabricated tale? Can this yarn be unwound to get to the meat of the matter?

The answer to this puzzler, perhaps the holy grail of American Egyptology research (pardon the mixed metaphor), may have at long last been found at Brown University's John Hay Library. According to independent scholar and self-taught Egyptologist S.J. Wolfe, a document found in university's rare book collection is "the smoking gun" that proves mummies were mulched for newsprint.

It wouldn't be the first time human remains have graced the Hay Library's stacks: included in its holdings are three examples of anthropodermic bibliopegy, that is, books bound in human skin. (Andreas Vesalius's anatomy text, "De Humani Corpis Fabrica," and two editions of the folktale "Dance of Death," the skinny epidermises a result of 19th Century rebindings by private collectors.)

Richard Noble, a rare book cataloger at the Hay, answered an online inquiry from Wolfe seeking to find a fiber of truth to the story that mummies were indeed transplanted to the US in the mid-1800's, specifically, to use their high-quality wrappings as pulp material for manufacturing rag paper. (The actual corpora delicti, along with their sarcophagi and other personal effects, becoming just so much collateral impedimenta.)

Wolfe and Noble point to the so-called "Norwich Broadside," in the Hay Library as their supporting evidence that ancient mummified corpse wrappings were indeed the raw material used by New England paper mills beginning in the 1850's, when the supply of European-imported rags began to dwindle. (At the time, America was producing more newspapers than any other county, and using a staggering 405,000,000 pounds of rags per year to manufacture paper.) This broadside is titled "Hymn: for the bi-centennial anniversary of the settlement of Norwich, Conn." [1859] and was printed on paper supplied by the Chelsea Manufacturing Company of Norwich, Connecticut.

A notice, printed on the program, states that it was composed of material imported from Egypt, and taken directly from the ancient tombs where it had been used in embalming mummies. This document, says Wolfe, "was the key [until] we found supporting evidence." It is the first printed piece that actually documents using mummy wrappings for paper that she has come across in her research. There are only two copies of this broadside currently known to exist: the one at Brown University and another at the Connecticut Historical Society.

Wolfe has since uncovered the existence of 1850's New England paper mills that manufactured paper from mummy wrappings. The mummies were unspooled and their linen rags were washed before being processed, she says. "This whole 19th-century attitude is incomprehensible to us — we're so into preservation now." Some mummies were even "hacked at with axes and knives," by these Yankee corpse-grinders in order to separate the linen wrappings from the mortal remains.

In the mid-nineteenth century, Egyptomania was still rampant, so putting together paper manufacturing and top of the line linen harvested from ancient cadavers would sew up a good portion of the market, and, it was hoped, on the cheap. An early example, perhaps, of respecting the environment: trees no longer need to lose their lives for almighty paper. What were once skin wraps became fodder for the rag trade.

In civilian life, Wolfe is a senior cataloger and serials specialist at the American Antiquarian Society in Worcester, Mass. But she really loves her mummies. Wolfe is currently compiling a comprehensive database of all Egyptian mummies and mummy disarticulations that remain in the U.S. Thus far, Wolfe says she has some 1,250 entries, representing about 550 individuals.

Each entry in the database is cataloged according to 25 categories, including the sex of the mummy, when he/she was first imported into the U.S., and the repository where the remains are housed. Wolfe says she hopes to post the completed database on the the Internet. This labor of love has been especially difficult: "Because I'm not affiliated with a university or a doctoral program, it has been hard to get information." Prior to her own investigation, scant research had been done in documenting the transmigration of cadavers from ancient Egypt to the new world.

Summing up much of her decade-long mummy research, Wolfe is the author of "Mummies in Nineteenth Century America: Ancient Egyptians as Artifacts," published in 2009. She hopes it's just the beginning of a much longer paper trail: "What I would dearly love to do is produce a field book of mummies in American museums."

http://www.bookpatrol.net/2010/02/has-this-library-solved-mystery-of.html?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+BookPatrol+%28Book+Patrol%29

'Contemplating the Void'
Take This Museum and Shape It
By ROBERTA SMITH

The Solomon R. Guggenheim Museum is capping the 50th birthday festivities for its Frank Lloyd Wright building with some navel gazing. Still, there are worse navels to consider. Wright's spiral rotunda, in fact, could be thought of as the greatest belly button in modern architecture: an innie and an outie all in one.

The rotunda is the inspiration for a frolicking, mostly feel-good show called "Contemplating the Void: Interventions in the Guggenheim Museum," for which more than 200 artists, architects and designers were invited to redesign or repurpose the space. "A self-reflexive folly" is how the project was described in the letters sent out by Nancy Spector, deputy director and chief curator of the Guggenheim Foundation, and David van der Leer, assistant curator of architecture and design at the museum. Participants were free to propose anything, since none of the proposals would be built.

Whatever they sent in has been included in the show: computer renderings and posters, drawings of all sizes, a few written proposals, a model or two. There are architectural elevations and cross sections, nearly abstract charcoals, collages and Conceptual teasers. Some works are exceptionally beautiful, as with Matthew Ritchie's radiant watercolor that re-envisions the museum as the point of origin of the imaginary cosmos at the center of his work. Others are pointed jokes, like Josephine Meckseper's digital print of an oil rig floating in water that fills the rotunda's base — a reference, perhaps, to the Guggenheim's involvement with Abu Dhabi, where a branch of the museum is scheduled to open in 2013.

This is the kind of low- budget, few-frills exhibition that major museums need to try more often, and it is not surprising that the Guggenheim, the smallest of New York's big museums, should set an example. The proposals are installed off-ramp, cheek-to-jowl in the museum's two fourth-floor galleries, unframed or in rudimentary vitrines. There are no labels. Instead the numbers beside each work match entries on a complimentary newsprint checklist available at the show's entrance. There's also not much in the way of text panels. Some proposals are instantly understandable, some incorporate written explanations, some remain mysterious. In all, the crowded display is a good foil for the Guggenheim's Tino Sehgal performance exhibition which has rendered the adjoining rotunda devoid of art objects and all the more easily contemplated.

The participants' imaginations have run wild, or at least wilder than usual, although they often travel in packs. Certain ideas recur, among them bridging the rotunda's gap, hanging things from the skylight and painting the interior or lining it with mirrors or chrome. Some of the most successful of these gestures achieve evocative transformations without adding much: Martha Rosler's rope bridges, for example, succinctly conjure a world before cast concrete, while Karen Kilimnik proposes a layer of silver glitter inside and out, which seems both decadent and girly.

The rotunda is also depicted more than once as an Edenic forest or a post-apocalyptic jungle, a conceit that almost always impresses. Saunders Architecture, from Bergen, Norway, contributes "FLW in His Element," which shows Wright in a stand of mighty redwoods, evoking his greatness, his love of nature and the Guggenheim's own longevity as an art space. A digital print by Sou Fujimoto Architects of Tokyo, in which pines soar deliriously overhead, captures the museum-as-national-park feeling with particular grandeur. The artist-team of Elmgreen and Dragset achieve a similar perspectival thrill — from the other direction — by adding so many rings to the ramp that the rotunda floor is just a speck.

Atmospheric effects achieved with lighting, diaphanous or ephemeral materials or lasers, and fiber-optic cables lend the museum a runway glamour. The Dutch designer Ted Noten proposes a constant shower of Swarovski crystals shimmering down from the top of the rotunda, to be recycled like water in a fountain. Anish Kapoor wants to release red smoke that would slowly be sucked up and out of the top of the building, although his digital images also suggest red powder or dry pigment streaming down from above — even less breather-friendly.

Such decorative schemes — many of them realizable, thanks to new technologies — are reminders of how slick and generic large-scale installation art has become since it first emerged. One of the earliest instances of it, which was designed for the Guggenheim itself, was shocking enough to be canceled: an enormous piece that Daniel Buren proposed for a sculpture survey in 1971 so outraged other proponents of installation art like Donald Judd and Dan Flavin that they threatened to pull out. Mr. Buren intended to install a wide banner of his signature stripes extending the full height of the rotunda — a scheme that has many echoes here. Julien De Smedt Architects of Brussels, in particular, evokes the Buren with an orange, curtainlike net that would spiral up through the space and that visitors could climb.

Mr. De Smedt's "Experiencing the Void" is one of several proposals that require what might be called extreme viewing. In "Soft Landing" the architect Toshiko Mori proposes a chute of net spiraling downward parallel to the ramp. MVRDV, architects from Rotterdam, would stretch an elastic membrane across the rotunda, for a trampoline effect — art encounters on the bounce. Vito Acconci Studio has a similar idea, but expresses it in a large Dr. Caligari digital print ribboned with a typically hypnotic Acconci poem about the urge to jump off the ramp in an attempt to fly. Weirder, though safer, is "Art/Trap," a proposal from Art Mass in Seoul that would have the balustrade remade in a spongy elastic material; viewers' heads, hands and feet would poke through in a continuous system of high-tech Pilgrim stocks. Now that's a captive audience.

Among the artists and architects who, like Ms. Meckseper, take the water route, Phoebe Washburn combines wet and dry viewing experiences in her "Guggenheim Scuba Park (Study)." A giant metal tank with windows inserted into the rotunda would allow scuba divers to drift up and down looking at people (and art) on the ramp and vice versa.

Another way to categorize the proposals might simply be Oedipal versus non-Oedipal, that is, those that aggressively manipulate the rotunda, sometimes beyond recognition, and those that leave it intact. Several participants use the place for its original purpose and depict tall bulky sculptures on the rotunda floor. Mona Hatoum generously proposes erecting Brancusi's "Endless Column." Others contribute greatly enlarged everyday objects that don't get much beyond Claes Oldenburg.

And some participants, mostly artists, present completely ephemeral events that take advantage of the building's structure to some degree. Christian Marclay's "Sound Event" would involve rolling quantities of small balls (golf, Ping-Pong, tennis) down the ramp. (A noninvasive variation on Robert Smithson's

"run-down" or pour pieces involving dump trucks full of dirt or tar dumped onto sloping terrain.) Paola Pivi proposes a large group hug that would fill the rotunda floor with a dense circle of people. (To which I overheard someone remark, "Would you have to pay to do that, or be paid?")

It's the architects, not surprisingly, who tend to be most Oedipal. Daniel Libeskind converts the building into a Libeskind by replacing its curves with straight lines and angles, although his dashed-off drawing seems to say, "I don't really mean it." Other proposals evince a more detailed malevolence, penetrating the rotunda with long, portholed tunnels (LOT-EK) or stretching it into an immense, rather intimidating space, as does the Tokyo architects Takuyahosokai. This proposal evokes both the fantasy structures of the 18th-century French architect Etiénne-Louis Boullée and, more ominously, I. M. Pei's yawing entrance to the Louvre.

A number of the proposals, to be sure, are no more than flights of fancy, harmless though often appealing. The Chinese artist Cao Fei reimagines the rotunda distended and flying above the city, a hybrid of kite and abstract intestine. The Map Office of New York, a design studio, sees it as a machine for making tornadoes. Torafu Architects of Tokyo superimposes a looping cloverleaf of roads on top of neighboring buildings, converting Wright's spiral into an on-ramp. Perhaps reacting to the museum's void as implicitly female, Pipilotti Rist fills it with a quite large, quite explicit freestanding set of labia. Inadvertently underscoring the need for this kind of response, Hans Schabus fills it with an all-too-phallic 62-foot-long, single-wide used mobile home. Urbanus Architecture & Design of Beijing turns the structure on its side, converting the outer surfaces of the balustrades become pathways for pedestrians. The image is an instant New Yorker cover.

Among nonvisual proposals, Cerith Wyn Evans, a British artist, proposes that a witch make the Guggenheim vanish for a few hours each year on April 9, the anniversary of Wright's death. And in an act of Conceptual hostility, the South African artist Kendell Geers would plant a bomb in the building. He apologizes for the people it would maim and kill, and goes on to detail an elaborate tongue-in-cheek tale involving a trial, conviction and life imprisonment that would, "in the long term, assist me in creating my second greatest work of art." Mr. Geers's version of the artist as renegade is more than a little histrionic. He needs to get out of his head, an activity that this exhibition strongly encourages.

"Contemplating the Void: Interventions in the Guggenheim Museum" is at the Solomon R. Guggenheim Museum through April 28; (212) 423-3500, guggenheim.org.

http://www.nytimes.com/2010/02/19/arts/design/19void.html?ref=design

'Constructive Spirit'
History Lesson in Abstraction, Cutting Across the Americas
By HOLLAND COTTER

NEWARK — Art museums are in the business of sorting out history. And it often falls to our smaller institutions to tackle the initial, broad-stroke cuts. Over the years the Newark Museum has taken on this path-clearing role with relish, particularly when the histories are transcultural in scope. It does so again in "Constructive Spirit: Abstract Art in South and North America, 1920s-50s," the capstone exhibition of the museum's centennial.

In this case, a chunk of the history is in Newark's collection. Throughout the first half of the 20th century, the museum assiduously bought, sometimes straight from artists' studios, a type of American painting and sculpture known as geometric abstraction. It's attractive stuff: intimate in scale and coolly design-savvy, but shot through with political and personal content.

For all its virtues, such art never found a wide audience. Dismissed as decorative and un-American in the isolationist 1930s, it was all but submerged in the flood tide of Abstract Expressionism. Newark was left with superlative holdings in an art no one knew or cared much about.

Appreciation has grown since and is bound to increase with this show. The inclusion of household names — Alexander Calder, Arshile Gorky, Ad Reinhardt — will help. But it's the presence of sparkling, less-noticed contemporaries like John Ferren, Raymond Jonson, Alice Trumbull Mason, John McLaughlin, George L. K. Morris and Charmion von Wiegand that turns a history lesson into an event, one that simultaneously broadens and sharpens the profile of American modernism.

That profile grows broader still, immeasurably so, with the show's inclusion of paintings and sculptures, all borrowed from other collections, by artists who were exploring similar abstract modes in South America during the same period. Several of them, and even a few specific works, were in "The Geometry of Hope: Latin American Abstract Art From the Patricia Phelps de Cisneros Collection," at the Grey Art Gallery at New York University in 2007.

But it's the equitable mixing of art from North and South America, and the influential exchanges such mixing implies, that makes the Newark show especially exciting.

It opens with the protean South American figure Joaquín Torres-García, who sets the basic geographic and stylistic coordinates for much that follows. Born in Montevideo, Uruguay, in 1874, he spent much of his early adulthood in France and Spain sampling European modernism, taking particular interest in the abstract geometric styles associated with utopian movements like Russian Constructivism and Dutch Neo-Plasticism.

Right in the middle of this decades-long European sojourn, though, he took an important break. In 1920 he moved to Manhattan and spent two years there soaking up New York's still raw globalist energy. This was just the stimulus he needed to create what he considered a new kind of New World Art. And it was in pursuit of that goal that he eventually returned to Uruguay for the second half of his productive career.

To get a vivid sense of Torres-García's Manhattan experience, I highly recommend a visit to a second show, "Nexus New York: Latin/American Artists in the Modern Metropolis" at El Museo del Barrio in Manhattan (through Feb. 28). But to understand his role as a pivotal link between the Americas, and between the Americas and Europe, two paintings by him in the Newark show may suffice.

In "New York Street Scene" (1920), the European-derived geometric model is firmly in place, but it has been packed with details of New York life: enclosing walls; shop signs; traffic jams; pedestrians, most of them dark-skinned, heading every which way. It's an image of chaos, but compartmentalized and contained.

The second painting, "Locomotive With Constructive House," dates from 1934, the year he returned to Montevideo. Here, geometry and abstraction predominate; you can take the blocks of primary colors as a cityscape, or not. And when Torres-García later fills them, it is with half-abstract, emblematic things: pictographs evoking the ancient and aboriginal cultures of South America.

Together the two pictures suggest some of the elements common to artists working in a geometric mode in North and South America: a blending of local and trans-Atlantic sources; a fundamentally urban sensibility; and an awareness of art's use as a vehicle for abstract ideas and muted feelings.

An urban vision is the theme of the show's first section. It's there in a 1934 painting of rainbow-hued machine parts by the New York artist Paul Kelpe and in Theodore Roszak's copper-and-steel "Airport Structure" (1932), which looks like a cross between a radio tower and a kitchen appliance. And we find it again in the striking 1936 painting "Constructivist Forms" by the Argentine artist Hector Ragni, with a single rectangular upright slab as assertively blank as an International-style modernist monument, and also in the interlocking units of Geraldo de Barros's "Movement Counter Movement," which suggests a floating space station.

The dynamic of nationalism versus internationalism was naturally a burning one. To varying personal degrees, artists in both North and South America wanted their work to be of its time and place, but also part of a larger world; to be culturally specific, but with universal reach.

The Uruguayan painter Rosa Acle, like Torres-García, filled her modernist grids with pre-Columbian symbols. The New Mexican artist Joe Hilario Herrera, who was an American Indian, embedded Pueblo references in his abstract paintings. Jonson, who was not an American Indian, did the same — for him the Southwest was transcendentalist terrain — while von Wiegand cooked up a distinctive strain of abstraction that was equal parts Mondrian and Tibetan Buddhist mandalas.

The Brazilian artist Lygia Clark insisted that her geometric painting was true abstraction, with no representational content; later, however, she developed untraditional forms of malleable, wearable sculpture and sometimes designed them to have therapeutic properties. And much of the most interesting material in the Newark show is art that directly engages its environment.

Like Clark, Calder and the Argentine artist Gyula Kosice made sculptures that physically moved. Jesús Rafael Soto, working in Caracas, Venezuela, and Irene Rice Pereira, in New York, created multilayered reliefs that turned optically kinetic as viewers moved in front of them. The “paintings” of Abraham Palatnik, a Brazilian, consisted of colored lights placed behind cloth to create a kind of Lava-lamp effect that eventually took on wraparound dimensions.

And Mary Ellen Bute, who came to art through courses in stage lighting at Yale and worked in New York from 1934 to 1953, produced a whole series of abstract film animations using geometric sculptures as subjects. Remarkably, her animations sometimes ran as shorts preceding Hollywood movies at Radio City Music Hall.

Abstraction was a loaded genre for female artists, who were — still are — working in a man’s world. As the art historian Aliza Edelman points out in the catalog, geometric art could be tactically used to disguise gender, or to reveal it in innovative ways. Mason, a New York founder of the American Abstract Artists group, spent a career resisting stylistic or ideological grooves.

The spirit of her 1942 “Oil Composition” is characteristic: she breaks up what there is of a rectilinear grid by pushing a big, pale potato-shaped form straight through its center. Around the same time, Lidy Prati was making rigorously geometric paintings reflecting scientific and mathematical ideas current at the time in Buenos Aires. But she, too, was a subversive. She developed a vocabulary of linear forms so small that they feel like a secret language — as if geometric abstraction had been converted into some kind of private expressive code.

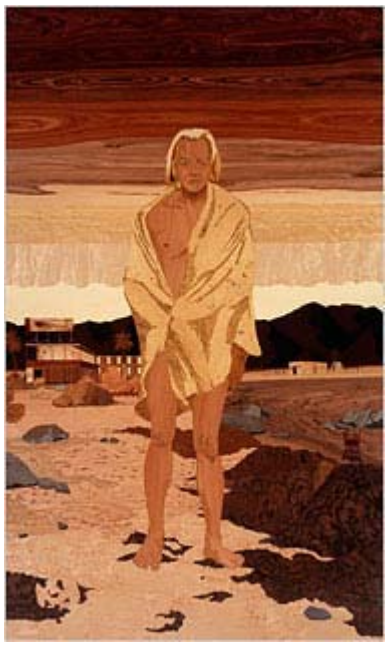
Mason and Prati are marvelous artists, though too different in styles, ideas and biographies to allow for more than superficial comparisons. And the Newark show, organized by Mary Kate O’Hare, associate curator of American art at the museum, doesn’t ask us to make them. It discourages facile thinking. One major purpose of the exhibition seems to be to eliminate old views of North and South American modernism as representing a qualitative face-off, a competition for importance that one team must, inevitably, lose.

This makes total sense. At the same time, I have to say that the South Americans in the Newark show, playing so freely with movement, chance and light, take the prize for inventiveness. They really feel like artists of the future, and of a future that is still in the future. But that’s just how the American story appears, at least to one set of eyes, here. It could be told very differently and surely will be in exhibitions to come, though it is thanks to big thinking on the part of an adventurous small museum that the possibility for retelling is even there at all.

“Constructive Spirit: Abstract Art in South and North America, 1920s-50s” continues through May 23 at the Newark Museum, 49 Washington Street; (973) 596-6550.

http://www.nytimes.com/2010/02/19/arts/design/19constructive.html?ref=design

'185th Annual'
Academy Gives Art Some Wiggle Room
By KAREN ROSENBERG



The 2010 Whitney Biennial, which opens next week, is one of the leanest in recent memory. So by its own standards is the National Academy Museum's "185th Annual: An Invitational Exhibition of Contemporary American Art" — down to 65 artists from the usual 120 or so. Reduced finances are to blame, in both cases.

Oddly, this situation is the best thing that could have happened to the Invitational. The standards for this juried exhibition have tightened, and its mission — contemporary art with a visible connection to the traditional studio practice — has a new clarity and intensity.

It helps that some 400 artists, an unprecedented number, submitted work. Quality is high overall. Congestion has been reduced, even though the show occupies fewer galleries than before. Large swaths of the fourth floor and part of the second are left empty. (This is sad to be sure, but the overstuffed exhibitions of yesteryear didn't do the art any favors.)

A side effect of the show's winnowing is the widening of the gap between the academy's members-only Annuals and its Invitational (nonmember) Annuals, which alternate years. The members' shows have become walled fortresses of figuration and complacent gestural abstraction. The Invitationals look more contemporary, though still dominated by painting. (Since this is the academy and not the Museum of Modern Art, that's not even up for debate.)

The lineup for this year's Invitational looks almost suspiciously young and sexy. It includes the relative newcomers Dana Schutz, Ghada Amer, Chris Martin and Alison Elizabeth Taylor, all of whom have been successful in the market. Petah Coyne, Lari Pittman and Barkley L. Hendricks have longer résumés but a similarly strong following in Chelsea.

It's great to see them all here, mixing with lesser-known talents like Judith Bernstein, Michael Schall and Anna Lambrini Moisiadis. At times, though, you sense that the selection committee gave some of the bigger names an automatic pass. "Girl With a Dog" (2009) isn't one of Ms. Schutz's better canvases, although its confettilike dots strike a festive tone. And Mr. Hendricks, a celebrated portraitist, is not well served by a small oddity of a landscape.

The academy's shambolic Beaux-Arts building can be hostile to curators, but the extra wiggle room this year has given the organizer Marshall Price a break. He works with the architecture instead of against it, for instance, hanging vibrantly patterned pieces in a room with a zigzagging floor inlay.

Most inspired is the placement of Ms. Taylor's gigantic marquetry work of a beachcomber in a domed, marble-floored alcove on the second floor. Luxury is the glue in this May-December romance.

Even the normally problematic fourth floor, with its low-ceilinged and windowless galleries, looks sharp. Here you'll find small-scale works — drawings, prints, collages and cabinet paintings — with an outsize level of ambition.

Tucked away by the elevator is a large-scale Surrealist object, Stina Köhnke's "Spell" (2007) — a fainting couch upended and draped in tan felt, with dozens of little pouches containing tweezers. Like much else in the show it is formally ingenious and a little wicked.

Nearly everything in the exhibition reveals some trace of the maker's hand, but the academy has embarked on a few tentative forays into more distanced art forms. One of them is Nina Yankowitz's installation "Buried Treasure/Secrets in the Sciences," on the second floor. With digital projections on a laboratory table, it highlights overlooked female scientists: an interesting topic, but the piece looks cold and forbidding in a room of mostly painting.

Nearby, though, is a light-boxed photograph by Cildo Meireles, made in homage to Piero Manzoni, the Arte Povera legend. In it, Mr. Meireles does a headstand on a famous Manzoni plinth in Denmark. The Manzoni, inscribed with "socle du monde" ("base of the world"), proclaims that art is everywhere we look. Mr. Meireles's playful tribute may be the closest the academy has come to engaging the sort of Conceptual shenanigans that go on across the street at the Guggenheim.

The academy hands out prizes for specific types of painting (and some other mediums), as seen by the placards on several works. This may seem conservative, but the winning entries describe a field of remarkable breadth. They include Ms. Schutz's messily exuberant canvas, Richard McLean's photorealist landscape and Elisa Jensen's haunted, Peter Doig-like blend of abstraction and figuration.

Learning to do more with less isn't a bad thing for the academy. For the time being it forces the jury to be choosier and ensures that the art that makes the cut will be shown to best advantage. Ideally some of these lessons will translate to the members' Annuals.

"The 185th Annual: An Invitational Exhibition of Contemporary American Art" continues through June 8 at the National Academy Museum, 1083 Fifth Avenue, at 89th Street; (212) 369-4880, nationalacademy.org.

http://www.nytimes.com/2010/02/19/arts/design/19academy.html?ref=design

Colossi, Both Kitschy and Compelling

By KEN JOHNSON

Viola Frey's giant ceramic sculptures of men and women are among the underappreciated wonders of late-20th-century art. Rising 11 feet and higher, wearing business suits and ties and nondescript dresses, they have a spookily imposing physical presence and a clunky, cartoonish ugliness.

Roughly glazed in strident colors and made in sections that fit together like blocks in a stone wall, they could be mistaken for a species of Outsider art. Because of their size and their blank or seemingly angry expressions, they may remind you of what it was like to be a child among grown-ups troubled by incomprehensible problems.

Frey, who died in 2004 at the age of 70, is the subject of "Bigger, Better, More: The Art of Viola Frey," an exhibition at the Museum of Arts and Design that was organized by the Racine Art Museum in Wisconsin and the Gardiner Museum in Toronto.

Unfortunately the badly misconceived, claustrophobic installation undermines the power of the sculptures. The larger ones are backed up against walls and into corners, so you can't walk around them as you should. And the biggest and best works are displayed in a row, like suspects in a police lineup, in the distractingly busy area outside the second-floor elevators. Frey's looming colossi need a lot more breathing room.

An exhibition of Frey's work at the Nancy Hoffman Gallery in Chelsea through Feb. 20 provides that kind of space for two big sculptures, a seated nude and a man glazed all white who stands more than 10 feet tall. Nevertheless, for the uninitiated especially, the Museum of Arts and Design show is a good introduction to the work of a true original. A resident of San Francisco for most of her adult life, Frey belonged to a generation of artists who made ceramic sculpture a force to be reckoned with in the 1960s and '70s. Peter Voulkos started the revolution in the late '50s with his raw, nonrepresentational clay works made in the spirit of Abstract Expressionism. Robert Arneson's jokey narratives and Ken Price's small, adamantine abstractions expanded the field. (An exhibition called "California Dreamers: Ceramic Artists From the MAD Collection," also on view, gives a sense of the context from which Frey emerged.)

In the '60s Frey incorporated kitschy found objects — like figurines, toys, animals and other knickknacks — into rambunctious, pedestal-scale, gaudily glazed assemblages. The works showed an ambition to

escape the genteel associations of traditional ceramics. But it was not until she veered toward life-size realism that she found her own distinctively personal voice.

"Double Self" (1978) is a pair of nearly identical, life-size, full-figure portraits of the artist. Wearing a paint-spattered smock and '70s-style long hair and sandals, she holds her hands out, palms up. With her mouth half-open, she seems to be asking some important question. These are not flattering self-portraits. As in "Baby in Baby Carriage" (1975-1999), a sculpture of herself as a toddler dozing in a stroller, she resembles a character in a comic book by R. Crumb.

At this point you can imagine Frey developing a more and more refined realism, but instead she went the other way, toward robust, archetypal simplification. "Fire Suit" (1983) is an eight-foot-tall man in a bright red suit and yellow tie looking straight ahead with an impassive expression. In his infernal outfit he might be a modern Satan.

Besides his striking scale, a big part of the attraction of the man in the incandescent suit is the painterly treatment of his surfaces. With a brushy, Fauvist approach, Frey gave his garments slashing white and orange highlights and added purple shadows to his yellow face. He is as much a three-dimensional painting as a conventional statue.

Frey was influenced by the Bay Area figurative paintings of artists like Richard Diebenkorn and Elmer Bischoff as well as by the bold, cartoonish paintings of Joan Brown. Frey painted and drew with considerable ambition herself, and there are examples of her two-dimensional work in the exhibition, though they are far less compelling than her sculptures.

On a three-panel canvas measuring 14 feet across, "Studio View — Man in Doorway" (1983) has a combustive energy. The primary image — of a man stalking out of a room, leaving a woman in tight clothes who seems to be dancing with another man — is certainly intriguing. In another life Frey might have been a German Expressionist. The trouble is that she filled the empty space around the main actors with images of countless free-floating statuettes, creating a cluttered, chaotic impression.

Frey's sculptures are more focused psychologically as well as formally. "Weeping Woman" (1990-91), a seated nude that would be about 12 feet tall if she stood up, wipes a tear with one raised hand. The gesture is a nod to Picasso, of course, but it's not just an art-historical riff; her grief is palpable. The nine-foot "Man Observing Series II" (1984) stands with hands on his hips and gazes downward with a stern mien as though reprimanding a disobedient youngster. This too feels autobiographical. That such monumental, comical figures harbor such poignant emotions is what makes them more than just oversized tchotchkes.

One of the most arresting sculptures is a multi-figure tableau called "Family Portrait" (1995), in which more than a dozen people of both sexes — from child size to doll-size — are gathered around a large bust of a generic, worried-looking white man in a suit and tie. It resembles a medieval altarpiece, but with its 1950s-type patriarch surrounded by all his women and children, it also has a dreamy, Freudian vibe.

"Bigger, Better, More: The Art of Viola Frey" runs through May 2 at the Museum of Arts and Design, 2 Columbus Circle; (212) 299-7777, madmuseum.org. "Every Man, Every Woman: The Figures of Viola Frey" runs through Saturday at the Nancy Hoffman Gallery, 520 West 27th Street, Chelsea; (212) 966-6676.

http://www.nytimes.com/2010/02/17/arts/design/17viola.html?ref=design

Under a Strange, Soulful Spell

By DWIGHT GARNER
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PRINCESS NOIRE

The Tumultuous Reign of Nina Simone

By Nadine Cohodas

Illustrated. 449 pages. Pantheon Books. $30.

In 1960, one year after Nina Simone's first album, "Little Girl Blue," was released, the poet Langston Hughes struggled to put the appeal of Simone's music and presence — that dusky voice, that unblinking gaze — into words. "She is strange," Hughes wrote in The Chicago Daily Defender. "So are the plays of Brendan Behan, Jean Genet and Bertolt Brecht. She is far out, and at the same time common. So are raw eggs in Worcestershire."

Hughes was just getting warmed up. "She is different. So was Billie Holiday, St. Francis and John Donne. So is Mort Sahl, so is Ernie Banks." He continued: "You either like her or you don't. If you don't, you won't. If you do — wheee-ouuueu! You do!"

Simone soon befriended Hughes, and through him she dove into the beating heart of that era's young black intelligentsia, becoming close to both James Baldwin and Lorraine Hansberry, who would become godmother to Simone's daughter. That Simone was absurdly talented was already clear. But her new friends helped crystallize her inchoate political thinking.

One result was a stunning song, "Mississippi Goddam," written by Simone in the wake of the 1963 Birmingham church bombings and the killing of the civil rights advocate Medgar Evers. In many respects it represented the pinnacle of what would become a long and tangled career. "Alabama's got me so upset," Simone sang. "Tennessee made me lose my rest./But everybody knows about Mississippi Goddam."

It was a song that inserted her into the forefront, at least musically, of the civil rights movement. Its recording is a moment that Nadine Cohodas's fascinating if turgid new biography of Simone, "Princess Noire," builds toward and then falls away from. In the case of her career, that falling away was a long, slow and painful one into mental illness, megalomania and increasingly strange behavior.

Nina Simone was born Eunice Waymon in Tryon, N.C., in 1933. She was one of eight children. Her father worked a variety of jobs (cook, dry cleaner, barber), and her mother was a Methodist minister. People knew right away that she was special. When she was 8 months old, she could hum "Down by the Riverside." At 2 ½ she could play a church organ.

Simone's dream was to become a concert pianist, and she studied briefly at Juilliard. She was devastated when she was turned down by the Curtis Institute of Music in Philadelphia, a rejection that may have been racially motivated, Ms. Cohodas writes. To pay the rent Simone began playing in bars, where she treated her gigs almost like concert recitals. She began to sing as well as play and took Nina Simone as a stage name in part, Ms. Cohodas suggests, to hide from her mother that she was playing in sometimes unsavory places.

Simone had, almost immediately, an electric effect on listeners. She brought to the stage, one critic wrote, "an atmosphere of blue lights and sad memories." On her first LP Simone recorded a version of "I Loves You, Porgy," and it became a Top 20 hit.

Before long she was playing the Village Vanguard in New York and the Newport Jazz Festival, even appearing on "The Ed Sullivan Show." And she was pouring out the songs that would define the early part of her career: "Don't Let Me Be Misunderstood," "Sinnerman," "Feeling Good," "I Put a Spell on You."

From the start audiences and critics had trouble pinning Simone down. She was a classically trained pianist, but her work also drew upon jazz, gospel, the blues, folk and European art songs. When the jazz writer Ralph J. Gleason described her as "some exotic queen of some secret ritual," he was commenting on her comportment as much as her sound.

Simon was a remote and formidable presence onstage, not afraid to stop a song midchord in order to chew out a talky audience member. While playing at the Apollo Theater in Harlem in 1961, she snapped, "For the very first time in your lives, act like ladies and gentlemen at the Apollo."

Her anger spilled over offstage too. After the Animals had a hit in 1965 with "Don't Let Me Be Misunderstood," a song that was written for Simone, she confronted the band's lead singer, Eric Burdon. "So you're the honky," she said, "who stole my song and got a hit out of it?"

Simone became increasingly politicized in the late 1960s and early '70s. She recorded some intense and moving songs, — including "Four Women," and "To Be Young, Gifted and Black," based on a play derived from Hansberry's unfinished writings — and began dressing her sidemen in dashikis. But she also alienated audiences, showing up late or not at all, hectoring them from the stage.

The second half of "Princess Noire" chronicles Simone's slow descent into mental illness; she was ultimately diagnosed as having schizophrenia, Ms. Cohodas writes. There are suicide attempts and frightening moments onstage and in hotels. When a friend took Simone to a musical revue in Washington, she began speaking to the onstage performers from her seat.

She was given to bitter onstage utterances like "I don't wear a painted smile on my face, like Louis Armstrong." She demanded she be called "Dr. Simone" after receiving an honorary degree from Amherst College. She claimed in one interview to be the reincarnation of an Egyptian queen.

Nina Simone was married twice and had a daughter, Lisa, but to many people she often seemed lonely. She didn't take care of her money and was in constant financial trouble. She left the United States in 1973 and lived in Liberia and Barbados before moving to France, where she died in 2003, apparently after a stroke.

Simone wrote an autobiography, “I Put a Spell on You,” that was published in 1991, but Ms. Cohodas is convincing on the subject of that book’s factual deficiencies. Ms. Cohodas has clearly done her research, but “Princess Noire” remains a strangely distanced and brittle biography.

The book describes concert after numbing concert, until all the stage patter gets mixed up in your mind. At times it reads less like a biography than a depersonalized series of performance reviews snatched from Variety. The arc of Simone’s life story becomes blurred and often lost.

Reading “Princess Noire,” you also wish that Ms. Cohodas, whose previous book was a biography of Dinah Washington, put her critical voice to stronger use. Nina Simone recorded an avalanche of music (“I made 39 albums, and they’ve pirated 70,” she complained in the 1980s), plenty of it lame. Ms. Cohodas doesn’t spend much time wading through this material, helping us compile our mental playlists or directing us toward worthy, lesser-known Simone recordings.

“Talent is a burden not a joy,” Simone said during a sloppy, uncomfortable 1978 concert at the Royal Albert Hall in London. “I am not of this planet. I do not come from you. I am not like you.”

Nina Simone was not, this biography makes clear, quite like anyone. That night in London she pulled herself together and played a final song, a dark version of “I Put a Spell on You.” And then she walked off the stage.

http://www.nytimes.com/2010/02/19/books/19book.html?ref=books

Tolstoy & Co. as Objects of Obsession

By DWIGHT GARNER

THE POSSESSED

Adventures With Russian Books and the People Who Read Them

By Elif Batuman

296 pages. Farrar, Straus & Giroux. $15.

Early in Elif Batuman's funny and melancholy first book, "The Possessed," she describes her disillusionment, as a would-be novelist, with "the transcendentalist New England culture of 'creative writing.' " The problem with creative writing programs, she says, is their obsession with craft.

"What did craft ever try to say about the world, the human condition, or the search for meaning?" Ms. Batuman asks. "All it had were its negative dictates: 'Show, don't tell'; 'Murder your darlings'; 'Omit needless words.' As if writing were a matter of overcoming bad habits — of omitting needless words."

Ms. Batuman's search for something more from literature than "brisk verbs and vivid nouns" led her, swooning but alert, into the arms of the great Russian writers: Tolstoy, Pushkin, Dostoyevsky, Chekhov, Babel.

And it led her to write this odd and oddly profound little book, one that's ostensibly about her favorite Russians but is actually about a million other things: grad school, literary theory, translation, biography, love affairs, the making of "King Kong," working for the Let's Go travel guidebook series, songs by the Smiths, even how to choose a nice watermelon in Uzbekistan. Crucially and fundamentally, it is also an examination of this question: How do we bring our lives closer to our favorite books?

Ms. Batuman is a young writer whose family background is Turkish, not Russian. Born in New York City, she grew up in New Jersey before graduating from Harvard and earning a doctorate in comparative literature from Stanford. Her career, thus far, has seemed blessed. Her first piece of journalism, a profile of a former Thai kickboxing champion, ran in The New Yorker. The longish essays in "The Possessed" first appeared in that magazine, as well as in Harper's and n+1.

In one of these essays, Ms. Batuman delivers a paper at a Tolstoy conference in Russia. In another, she picks up Babel's daughter for a conference at Stanford. In yet another, she travels to Uzbekistan to learn

its language. Each of these essays unfolds both comically and intellectually, as if Ms. Batuman were channeling Janet Malcolm by way of Woody Allen.

Among the charms of Ms. Batuman's prose is her fond, funny way of describing the people around her. One professor's mustache and mobile eyebrows give him "the air of a 19th-century philanderer." A boyfriend steps off an airplane looking "as philosophical and good-humored as Snoopy." Even the Tolstoy scholar who becomes incontinent on a chartered bus trip and refuses to throw out his soiled pants becomes, in her hands, a comic figure out of Isaac Bashevis Singer.

Ms. Batuman lets her opinions fly freely. She describes feeling "deeply, viscerally bored" by an Orhan Pamuk novel. About reporting on Turkey for a Let's Go guidebook, she bemoans the "exasperating 20th-century discourse of 'shoestring travel.' "

She explains: "The worst part of this discourse was its specious left-wing rhetoric, as if it were a form of 'sticking it to the man' to reject a chain motel in favor of a cold-water pension completely filled with owls." About trying to secure academic grant money, she writes, "Translation jobs always made me want to jump out a window."

Perhaps Ms. Batuman's best quality as a writer, though — beyond her calm, lapidary prose — is the winsome and infectious delight she feels in the presence of literary genius and beauty. She's the kind of reader who sends you back to your bookshelves with a sublime buzz in your head. You want to feel what she's feeling.

About Chekhov's story "Lady With Lapdog," Ms. Batuman writes, "I especially remember the passage about how everyone has two lives — one open and visible, full of work, convention, responsibilities, jokes, and the other 'running its course in secret' — and how easy it is for circumstances to line up so that everything you hold the most important, interesting, and meaningful is somehow in the second life, the secret one."

She describes two historical types of Uzbek writers: "the aristocrats, who loved beautiful women, nature and kings; and the democrats, who loved mud and head colds."

Her defense of literary theory is lovely. "I stopped believing that 'theory' had the power to ruin literature for anyone, or that it was possible to compromise something you loved by studying it. Was love really such a tenuous thing? Wasn't the point of love that it made you want to learn more, to immerse yourself, to become possessed?"

Ms. Batuman is almost helplessly epigrammatical ("Air travel is like death: everything is taken from you"), and it's tempting to keep quoting from her book forever. There are moments in "The Possessed" where Ms. Batuman loses the threads of the stories she's trying to tell, moments where plot summary or historical précis drag on too long. But these data-dump moments are rare.

Elif Batuman is clearly one of those people whom Babel described, in one of his Odessa stories, as having "spectacles on his nose and autumn in his heart." Her autumnal impulses are balanced by jumpy, satirical ones. It's a deep pleasure to read over her shoulder.

http://www.nytimes.com/2010/02/17/books/17book.html?ref=books

Keep Calm and Never Mind, Britain Says in Its X-Files
By SAM ROBERTS

If you've ever been kidnapped by aliens from outer space, don't complain to the British Ministry of Defense.

"Abduction is a criminal offense and as such is a matter for the civil police to handle," the ministry advised a constituent from Lancashire. "The police can only investigate allegations of abduction if there is evidence to suggest that such a crime has taken place. As to date, the M.O.D. is not aware of any evidence which might substantiate the existence of extraterrestrial life forms, the matter of abduction by 'aliens' remains a nonissue as far as the M.O.D. is concerned."

On Thursday, the British National Archives released thousands of pages of the government's classically understated responses to sightings of flying saucers and other unidentified flying objects (which, a summary explains, some experts prefer to call "unidentified aerial phenomena" which "does not imply the existence of an 'object' of extraterrestrial origin").

In one case, when local farmers reported seeing a mysterious disc-shaped object on the grounds of an electronic signals monitoring base operated jointly with the United States, the ministry issued this unequivocal and straight-faced denial: "No U.F.O./flying saucer has landed in the vicinity of Menwith Hill and the base had no connection with U.F.O. research."

While the documents contain no smoking space gun, they recall that some senior military figures took the reports of sightings seriously. Lord Mountbatten, the chief of the defense staff, "believed U.F.O.'s were real and of interplanetary origin," a briefing document from the ministry said.

And the documents acknowledge that of the 11,000 U.F.O. reports logged between 1959 and 2007, about 10 percent could not be readily explained. That does not necessarily suggest that 1,100 flying saucers were sighted, the Air Ministry explained early in that period.

"The fact that the other 10 percent are unexplained need be attributed to nothing more sinister than lack of data," the ministry said. "As for controlled manifestations from outer space, there is no tangible evidence of their existence."

That has not stopped people from reporting them. A Birmingham man saw a triangular one (they generally range in shape from traditional saucers to elongated cigars and Toblerone chocolate bars) hovering over his backyard. It left a "silky white substance," which he collected in a jar, on his tree tops.

In 1996, the astronomer Carl Sagan wrote a letter asking whether the government was involved in a cover-up of crop circles.

Strange rotating red, blue, green and white flashing lights seen by police officers in the English towns of Boston and Skegness and also detected on radar turned out to be nothing more unusual than bright stars and "a 'permanent echo' created by a tall church spire in the Lincolnshire Wolds."

The British remained open-minded, though. Consider the Defense Ministry's response to this question, about a sighting that spawned a generation of saucer buffs: "What do you believe happened at Roswell, New Mexico, July 8, 1947?"

To which the ministry replied inscrutably: "Insufficient evidence to make a subjective judgment."

http://www.nytimes.com/2010/02/19/world/europe/19saucers.html?ref=science

Empathy Conducive to Creativity

By: Tom Jacobs | February 17, 2010 | 16:41 PM (PDT) |

New research suggests creativity in the workplace is enhanced by concern for others' needs, and a willingness to walk in their shoes.

Creativity is usually thought of as internally motivated — a response to a deeply felt personal urge to challenge convention, push boundaries and explore. But newly published research suggests that, at least in the business world, the link between inspiration and ingenuity is strengthened by focusing on the needs of others.

Writing in the *Academy of Management Journal*, Adam Grant of the University of Pennsylvania's Wharton School and James Berry of the University of North Carolina at Chapel Hill report "intrinsic motivation is most likely to be associated with higher levels of creativity when employees are also prosocially motivated to take the perspective of others." At least in a workplace situation, taking others' needs into account, and seeing things from their point of view, seems to be a catalyst to creativity.

Grant and Berry describe three studies that support this conclusion: One a laboratory test featuring 100 college students, and two involving surveys of workers and their supervisors. In one study, 90 security force officers at an American military base filled out surveys regarding their attitudes toward their work. They rated the accuracy of a series of statements measuring their intrinsic motivations ("I enjoy the work itself") and prosocial motivations ("I want to help others through my work").

Nine months later, their supervisors were asked to evaluate their job performance in terms of creativity. "Officers with high levels of intrinsic motivation were more likely to earn higher supervisor creativity ratings when they also had high levels of prosocial motivation," the researchers report.

A second, similar study of 111 employees and their direct supervisors at a water treatment plant again found that "intrinsic motivation was positively related to creativity when prosocial motivation was high, but not low." The implication is that novelty (inspired by an inner drive to explore) plus a focus on usefulness (inspired by understanding the needs of others) is a catalyst for creativity.

The researchers believe their results have practical applications for those who run organizations.

“Managers typically seek to stimulate creativity by creating conditions that are conductive to intrinsic motivation, such as designing challenging and complex tasks, providing autonomy, and developing supportive feedback and evaluation systems,” they write. But to “facilitate the production of ideas that are creative in context,” they suggest managers “will find it advantageous to create conditions that support prosocial motivation and perspective-taking.”

Two ways to do so, according to Grant, are to “provide opportunities for employees to meet and interact with the people who benefit from their work, such as clients, customers, and other end users,” and to ”provide vivid information and stories from others that communicate the importance of the problem to be solved.”

Grant and Berry concede it’s unclear whether their findings “extend to domains such as the natural sciences, literature and the arts,” where usefulness is not the fundamental goal of creative work. On the other hand, there are times when a composer is asked to write music for a ballet, a painter is asked to design a stage set or an architect is commissioned to design a building whose occupants have certain specific needs.

Masterpieces have been created under all of those conditions, and this research suggests they may have emerged because of — rather than in spite of — the fact the artist was helping someone else achieve their goal. At times, it appears the desire to serve others is the mother of invention.

http://www.miller-mccune.com/culture-society/empathy-conducive-to-creativity-9322/

Breaking through the noise of social media

Proven sources like academics and experts gain influence as people become more skeptical of peer recommendations.

Gregory Rodriguez

February 15, 2010

Way back in the 20th century, "buzz" was the *je ne sais quoi* of the marketing world. Every company wanted it, but few presumed to know how to get it. Back then, corporations generally lobbed their products into the marketplace, bombarded consumers with repetitive messages and sat back and prayed that buzz would magically appear.

That, of course, changed as companies learned how to harness the Internet. And, as social media like MySpace and Facebook emerged, marketing became less of a monologue and more of a multiparty conversation. It suddenly wasn't enough for companies and their spokespersons to speak down to consumers from the mountaintop. The new challenge was how to get consumers to say good things about a product to one another.

The rise of social media has been part and parcel of the devolution of authoritative information and the flowering of a million cacophonous voices. It not only changed the way companies looked at consumers but how consumers looked at each other. By 2005, surveys showed that when it came to the marketplace, Americans were beginning to trust their peers more than well-known authorities and experts. The following year, according to the Trust Barometer Survey conducted by Edelman, an international public relations firm, saw the emergence of "a person like me" as a credible spokesperson for companies and products.

By 2010, nearly four in five corporations were planning to move money they once spent on television advertising to some sort of social media campaign. Two weeks ago, Pepsi chose to forgo a high-profile TV spot at halftime of the Super Bowl for a social-media-driven charity campaign that will award the nonprofit organizations that muster the most votes through virtual social networks. Could there be any better proof that social media is the future of marketing?

But hold on, now comes Edelman's 2010 Trust Barometer. The latest findings fly in the face of that formerly new conventional wisdom.

According to the survey, since 2008 the number of people who view their friends and peers as credible sources of consumer and business information *dropped* by almost half, from 45% to 25%. Similarly, in the past year, the number of people who view peers as credible spokespersons also slipped. Even more strikingly, however, after a precipitous decline earlier in the decade, informed consumers have regained trust in traditional authorities and experts.

What's going on? Are Facebook friends turning on each other? Did we lose faith in ourselves? Is social media just a fluke?

None of the above, says Gail Becker, Edelman's Western regional president. After sifting through the data, she concludes that consumers are merely rebelling against all the noise and reflecting the effects of uncertain times.

A few years ago, when peer-to-peer trust was at a peak, social media was still relatively new and its circles were manageable. But since then, the number of friend networks has exploded and every kind of business, for-profit and not, has sought to harness -- we might say, exploit -- them for their gain. That, according to Becker, has made people more skeptical of peer recommendations.

"Social media is more professionalized now and less organic," says Becker. "It's harder to know who to trust."

And in troubled times, such uncertainty is magnified. All of this explains the rise in the

number of people willing to

pay attention to sources like proven academics and experts. After indulging the thoughts and opinions of anyone who was "just like me," it seems that people are now looking for a firmer guarantee of clarity, objectivity and accuracy.

Although these findings are mostly about business and financial matters, they surely also have broader significance. They suggest that the flattening of authority may not go on forever, and that there are limits to Americans' belief in Everyman.

I'd like to think that this bodes well for one of the old, authoritative sources of information, the traditional media. Unfortunately, so far the survey also shows that the credibility of television and radio news and newspapers continued to take a beating over the past two years.

Cacophony and crisis prove the need for objectivity and expertise. What a relief. Call it old-fashioned, hierarchical or elitist, but in an era in which issues are only becoming more complicated, it's about time.

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http://www.latimes.com/news/opinion/commentary/la-oe-rodriguez15-2010feb15,0,1185580.column

Happiness wards off heart disease

Being happy and staying positive may help ward off heart disease, a study suggests.

US researchers monitored the health of 1,700 people over 10 years, finding the most anxious and depressed were at the highest risk of the disease.

They could not categorically prove happiness was protective, but said people should try to enjoy themselves.

But experts suggested the findings may be of limited use as an individual's approach to life was often ingrained.

At the start of the study, which was published in the European Heart Journal, participants were assessed for emotions ranging from hostility and anxiousness to joy, enthusiasm and contentment.

They were given a rating on a five-point scale to score their level of positive emotions.

By the end of the analysis, some 145 had developed heart disease - fewer than one in 10.

But for each rise in the happiness scale there was a 22% lower risk of developing heart disease.

" **Essentially spending a few minutes each day truly relaxed and enjoying yourself is certainly good for your mental health and may improve your physical health as well** "
Dr Karina Davidson

The team believes happier people may have better sleeping patterns, be less liable to suffer stress and be more able to move on from upsetting experiences - all of which can put physical strain on the body.

Lead researcher Dr Karina Davidson admitted more research was needed into the link, but said she would still recommend that people try to develop a more positive outlook.

She said all too often people just waited for their "two weeks of vacation to have fun" when instead they should seek enjoyment each day.

"If you enjoy reading novels, but never get around to it, commit to getting 15 minutes or so of reading in.

"If walking or listening to music improves you mood, get those activities in your schedule.

"Essentially spending a few minutes each day truly relaxed and enjoying yourself is certainly good for your mental health and may improve your physical health as well."

It is not the first study to suggest there is a link between happiness and health.

But Ellen Mason, of the British Heart Foundation, suggested such an association may be of limited value anyway.

"We know that improving your mood isn't always easy - so we don't know if it's possible to change our natural levels of positivity."

Cardiologist Iain Simpson, of the British Cardiovascular Society, added: "Things like reducing cholesterol and diabetes are more important when it comes to reducing heart disease.

"But at the end of the day it heart disease is still the biggest killer in the UK so anything you can do to help should not be ignored."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8520549.stm

Published: 2010/02/18 00:05:24 GMT

Fridge-free vaccine hopes raised
By Jane Dreaper
Health correspondent, BBC News

Scientists at Oxford University have found a way of keeping vaccines stable without refrigeration.

Writing in Science Translational Medicine, they say the breakthrough could significantly help efforts to immunise more children in rural Africa.

The researchers mixed the vaccines with two types of sugar before slowly drying them on a filter paper.

This preserved the jabs, which were then easily reactivated when needed for injection.

The need to keep vaccines cool - to stop them deteriorating - is often difficult in developing countries where fridges, clinics and an electricity supply cannot be taken for granted.

" **Without the need for refrigeration, you could even picture someone with a backpack taking vaccine doses on a bike into remote villages** "
Dr Matt Cottingham Researcher

Writing in the journal Science Translational Medicine, the scientists describe how they managed to keep vaccines stable for up to six months at 45C.

They used sucrose and another sugar called trehalose, which is known for its preservative properties.

'Simple and cheap'

The research was funded by the foundation set up by Bill and Melinda Gates. It involved a collaboration between the university scientists and a company, Nova Bio-Pharma Technologies.

The lead investigator, Professor Adrian Hill, said: "If we could convert all the standard vaccines to a solution like this, it would mean they're cheaper to deliver, because they'd survive at room temperature - and so there'd be scope to vaccinate more children.

"The technology is simple and extremely cheap - and there are no more scientific hurdles to overcome.

"Our tests were pretty tough as we used live viruses. So we feel that having stabilised those more fragile vaccines, this method should work for other vaccines containing dead protein.

"It's now just a matter of developing the technique, trying it out in Africa and seeing if it can be made on an industrial basis. This could happen within five years."

Another member of the research team, Dr Matt Cottingham, said: "Without the need for refrigeration, you could even picture someone with a backpack taking vaccine doses on a bike into remote villages."

The GAVI Alliance, a public-private partnership working to accelerate immunisation in 72 of the world's poorest countries, welcomed the news.

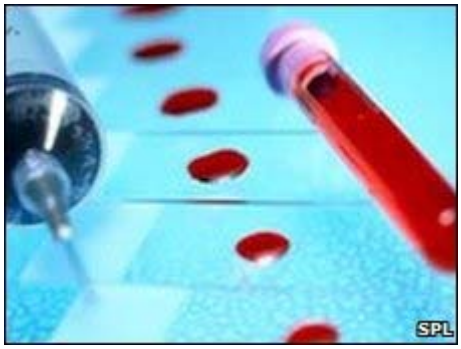
"Keeping vaccines at the correct temperature all the way from the factory to children in the poorest and most remote communities is always an enormous challenge so new ideas to remove barriers to the life-saving benefits of immunisation are extremely welcome," said the alliance's communication director, Dan Thomas.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8520825.stm

Published: 2010/02/18 00:05:54 GMT

Cancer detection blood test hope

Personalised blood tests which could track whether cancer treatment is working or if the disease has come back have been developed by US researchers.



The test identifies tumour DNA "rearrangements" which are specific to the individual patient.

In the future, this "genetic fingerprint" could be used to pick out tiny remnants of a tumour, Science Translational Medicine reports.

Such techniques are currently very expensive but costs are falling.

The researchers hope that one day the technology could be used to spot cancer recurrence before they would be picked up by scans.

DNA from volunteer patients was scanned for rearrangements of large chunks of genetic information which occur in cancer cells but not normal cells.

" **I'm quite optimistic that within five years this approach could be turned into something that's widely applicable** "
Dr Victor Velculescu

Known as personalised analysis of rearranged ends (Pare), the technique was developed using six sets of cancerous and normal tissue samples taken from four patients with bowel cancer and two with breast tumours.

They found between four and 15 DNA rearrangements in each of the six samples.

Using blood samples from two of the colorectal cancer patients, they found the test was sensitive enough to detect this marker or "fingerprint" DNA that had been shed by tumours into the bloodstream.

In tests on one patient, after surgery the levels of the marker DNA dropped due to the removal of the main tumour.

Then they rose again, suggesting that some cancer remained.

After chemotherapy and another round of surgery levels of the DNA markers fell once more.

The test was still picking up signs of the tumour which tallied with a small cancerous lesion in the patient's liver where the cancer had spread.

Cost

Further research is needed to ensure such a test could accurately detect cancer recurrence.

One current drawback is the expense with genetic sequencing costing about £3,200 per patient but, say researchers, costs are falling as the technology improves making the approach potentially more feasible.

Study leader Dr Victor Velculescu, from Johns Hopkins Kimmel Cancer Center in Baltimore, said: "I'm quite optimistic that within five years this approach could be turned into something that's widely applicable.

"Cancer more and more is becoming a chronic disease, and to manage a chronic disease you have to know how it's doing - is it getting better or worse?

"We haven't had any good ways of measuring how a cancer is doing up until now."

Co-author Dr Luis Diaz said: "Eventually we believe this type of approach could be used to detect recurrent cancers before they are found by conventional imaging methods like CT scans,"

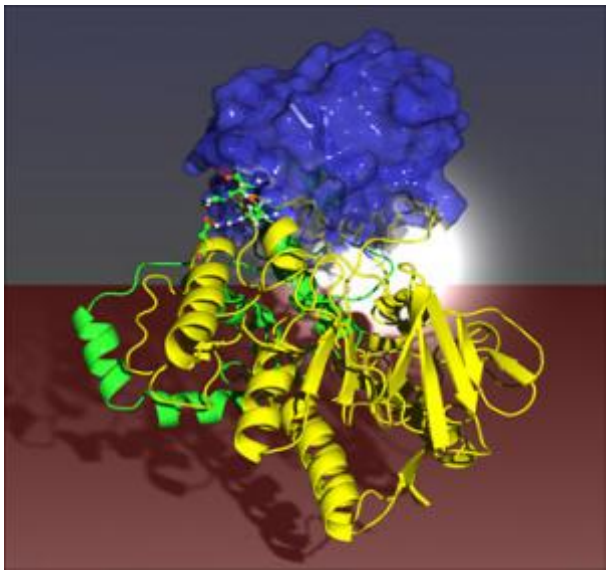
Professor Peter Johnson, Cancer Research UK's chief clinician, said: "The detection of DNA changes, unique to individual cancers, has proved to be a powerful tool in guiding the treatment of leukaemia.

"If this can be done for other types of cancer like bowel, breast and prostate it will help us to bring new treatments to patients better and faster than ever."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8522301.stm

Published: 2010/02/19 02:38:49 GMT

Enzyme Design With Remote Effects: Chemists Devise New Way of Optimizing Enzymes for Industrial Applications



An enzyme becomes more versatile: With the help of genetic modifications, Max Planck chemists have altered this monoxygenase in such a way that it converts numerous substrates. Two domains (blue and yellow) are drawn together through the substitution of two amino acids (left, red dots) with the result that the remote binding pocket enlarges due to an induced allosteric effect (right, white). (Credit: MPI for Coal Research)

ScienceDaily (Feb. 17, 2010) — Engineers are unlikely to tinker with the cooling system if they want to increase the size of an engine. Yet chemists at the Max Planck Institute for Coal Research have adopted an approach similar to this in their efforts to optimise an enzyme for practical applications.

They substituted two amino acids at a site relatively distal to the biocatalyst's binding pocket, the location where the chemical reaction takes place. This modification alters the overall structure of the enzyme in such a way that it can now convert a larger number of different chemical compounds. In addition, it produces preferentially one of two possible enantiomers which arise as what is known as a racemic mixture during traditional synthesis.

Although they are chemically identical, the enantiomers differ in terms of their structure, like a right and left hand. Only one of the two versions is usually suitable for use as a medically active agent. Thanks to their research, the Max Planck researchers have succeed in pointing the way to a new approach that will enable the conversion of enzymes tailored to the needs of the chemical and pharmaceutical industries.

The research is presented in the *Proceedings of the National Academy of Sciences* (early edition, January 27, 2010).

Enzymes work extremely reliably, however they are highly selective. They transform molecules that arise in nature into the precise form required by a cell or organism. However, they often only convert a single chemical compound -- like a garage that would specialise only in the repair of a particular model of vehicle. This is important in biology, as chemical aberrations can paralyse the machinery of the biomolecules. The chemical and pharmaceutical industries need catalysts, for example enzymes, which also process molecules that do not occur in nature. The enzymes involved here are often enantiomers, two deceptively similar compounds that differ like a right and left hand. Chemists are now facing the challenge of finding catalysts that only allow one enantiomer form to arise during a conversion process, that is, catalysts which have an enantioselective effect. Enzymes can sometimes be misappropriated as catalysts to obtain intermediate compounds through enantioselective synthesis for the production of

drugs. This process often fails, however, as the enzyme is incapable of recognising an enantiomer form: only one of two enantiomers should arise in the chemical reaction as, in most cases, only one displays the desired biological activity.

Researchers at the Max Planck Institute for Coal Research have now constructed an enzyme that converts numerous molecules enantioselectively with the help of directed evolution. "What we are doing here is bringing about evolution in a test tube," says Manfred T. Reetz, Director of the Max Planck Institute in Mülheim and who heads the current research activities. Hence, the chemists generate enzyme variants by gradually altering their structure through random mutations. Prior to this, they had already structurally modified or designed enzymes enantioselectively by causing random mutations in the active centre where the reaction occurs. They have now developed a fundamentally different strategy, however: the enzyme is altered at a site that is not involved in the actual reaction. "We have adopted a new directed evolution approach here and combined mutagenesis with rational design," says Manfred Reetz.

Reetz and his colleagues started with a natural Baeyer-Villiger monooxygenase. This enzyme oxidises a substrate molecule, a ketone to be more precise, inserting an oxygen atom at a precisely defined site. The product of this process is a lactone. Enantioselectively produced lactones are highly-prized intermediate compounds in the chemical and pharmaceutical industries.

The natural form of an enzyme often works completely non-selectively, that is, it cannot differentiate between enantiomers as both forms are converted with equal speed in the binding pocket. The situation is even more critical when the synthetic molecule is not even converted, as it does not fit in the binding pocket. "To enlarge this binding pocket for synthetic molecules we began by looking for a site in a structural model of the enzyme, in which changes reshape the binding pocket even though it is located at a relatively significant distance from the binding pocket," explains Juan Pablo Acevedo, who, together with Sheng Wu, was closely involved in the reshaping of the enzyme.

They suspected that the site at which amino acid substitution would display the desired effect is located at positions 93 and 94 in the amino acid chain. Based on theoretical considerations, the chemists came to the conclusion that suitable mutations should prompt structural reorganisation there with the result that two domains, that is two sub-units of the enzyme, move together: "Our thinking was that the binding pockets would have to enlarge if we pulled these two domains closer together," relates Juan-Pablo Acevedo. The researchers achieved this by simultaneously substituting the amino acids at the two positions with new agents by means of saturation random mutagenesis. The binding pocket actually enlarged when they inserted asparagine in the place of glutamine in position 93 and aspartic acid in the place of proline in position 94.

The enzyme then converted an entire series of different substances with high activity, and unusually high enantioselectivities were observed. The scientists succeeded in mastering something of a tightrope walk here: while a bigger binding pocket opens up the enzyme for a wider range of substrate molecules, it usually also reduces its stereocontrol over the reaction -- a problem did not arise here, however.

What is far more important for the researchers is that their approach basically works: that is, they can reshape the reaction centre by causing a structural change through remote mutagenesis. Biochemists are already familiar with so-called allosteric effects, that is, reorganisation in many enzymes which are accompanied by structural change in the relevant binding pocket. However, these effects are generated by small molecules that dock onto an enzyme far away from the binding pocket. "Using genetic technology methods, we have generated a targeted allosteric effect in an enzyme that is not actually allosteric," says Juan Pablo Acevedo. The Mühlheim-based researchers had already occasionally observed remote mutations in the course of the directed evolution of enantioselective enzymes; however, it had not been hitherto possible to attribute them to allosteric effects.

The altered enzymes are formed using re-programmed bacteria. The researchers infiltrate genetic maps for variants of a natural enzyme into the single-celled organisms. In these maps, they substitute the proposed amino acids at one or more sites. Instead of testing all 20 amino acids from which proteins are

constructed, however, they only use twelve. "This cocktail is highly representative of a mixture of structurally and electronically different amino acids," explains Manfred Reetz. Theoretically, the monooxygenase, which he and his colleagues had adopted as the model enzyme, has 144 variants with different amino acid combinations at positions 93 and 94. To actually obtain all of these variants, the scientists must breed approximately 400 colonies from the mixture of reprogrammed bacteria, isolate the enzymes from it and test it for their characteristics.

In this respect, four hundred variants is a small number. If the researchers do not carefully select the positions at which the changes promise to yield the desired effect, and instead apply "blind" random mutagenesis to the entire enzyme, the approach often adopted in directed evolution, they would probably have to test at least several hundred thousand variants -- too many for the method to be practicable for the chemical and biotechnology industries. "By combining rational design and random mutagenesis, we can considerably accelerate the development of enantioselective and thermostable enzymes," says Manfred Reetz. This is how he and his colleagues will also proceed in their future work on the conversion of enzymes. They will then combine the changes away from the binding pocket with reorganisation in the reaction centre itself. "We hope that this will enable us to achieve even greater enzyme optimisation," says Manfred Reetz.

Story Source:

Adapted from materials provided by Max-Planck-Gesellschaft.

Journal Reference:

1. Sheng Wu, Juan Pablo Acevedo, und Manfred T. Reetz. **Induced allostery in the directed evolution of an enantioselective Baeyer-Villiger monooxygenase**. *Proceedings of the National Academy of Sciences*, 2010; 107 (7): 2775 DOI: 10.1073/pnas.0911656107

http://www.sciencedaily.com/releases/2010/02/100216140406.htm

Non-Invasive Testing, Earlier Surgery Can Stop Seizures in Tuberous Sclerosis Complex

Anya, 2, who underwent non-invasive testing and surgery at UCLA, is now seizure-free. (Credit: Image courtesy of University of California - Los Angeles)

ScienceDaily (Feb. 17, 2010) — When medication fails to control seizures in children with tuberous sclerosis complex (TSC), a rare genetic disorder that affects multiple organ systems and frequently causes epilepsy, surgery to remove part of the brain is often necessary. But pre-surgical testing, which involves the implanting of electrodes into a child's head, can lead to longer hospital stays and greater risks from surgery.

Now, a study by researchers with UCLA's Pediatric Epilepsy Surgery Program has found that an alternative, non-invasive approach to pre-surgical testing, along with earlier consideration for surgery, is associated with the best seizure-free surgical outcome in patients with TSC.

"Surgery to remove the portion of the brain causing the epilepsy is the most successful treatment for children with TSC and intractable epilepsy, but mapping which parts to take out can be challenging in a disease with multiple tubers in the brain and therefore multiple potential seizure-generating regions," said lead study author Dr. Joyce Wu, an associate professor of pediatric neurology at Mattel Children's Hospital at UCLA.

"The standard test of implanting electrodes into the patient's head is uncomfortable, leads to a prolonged hospital stay with increased costs, and potentially increases the risks from surgery," she said. "Our study looked at the effectiveness of our non-invasive, diagnostic imaging approach, which appeared to work just as well."

The study is the first to examine UCLA's non-invasive approach, which uses a combination of magnetic resonance imaging (MRI), fluoro-deoxyglucose positron emission tomography(FDG-PET) and magnetic source imaging (MSI) to identify the area of brain to be removed. The results showed that approximately two-thirds of TSC patients became seizure-free after surgery. The non-invasive results were similar to the traditional surgical testing method of implanting electrodes into the patient's head for several days of monitoring.

Researchers also unexpectedly found that shorter seizure duration before surgery was associated with the best chance of children with TSC becoming seizure-free following surgery. Therefore, they said, it is important to consider surgery early, when medications fail to control seizures.

The study findings appear in the Feb. 2 issue of *Neurology*, the medical journal of the American Academy of Neurology.

Up to 90 percent of patients with TSC have epilepsy, with a significant portion suffering from medication-resistant, or intractable, epilepsy. For these patients, surgical removal of the tuber and surrounding cerebral cortex may offer seizure freedom.

The study included 28 TSC patients with intractable epilepsy referred to UCLA between 2000 and 2007. In addition to the standard pre-surgical evaluation, these patients had MSI and FDG-PET/MRI co-registration. None had the invasive intracranial test. Of these patients, 18 (64 percent) underwent surgical resection, and of those, 12 (67 percent) were seizure-free postoperatively with an average follow up of 4.1 years.

The study also confirmed that a younger age at surgery and shorter seizure duration were associated with post-operative freedom of seizures. Since epilepsy in children can be severely debilitating, early diagnosis and treatment are critical in helping a child reach full cognitive potential.

Anya, now two-and-a-half years old, underwent the surgery at UCLA when she was 16 months old. After suffering up to 30 seizures a day and her medications not working as effectively, Dr. Wu and her team suggested that Anya be evaluated for surgery to remove the offending tubers.

She then underwent the non-invasive testing and was found to be a good candidate for surgery. It has been more than a year since her seven-hour operation, and she is still seizure-free.

"TSC is a pretty devastating disease," said Anya's mother, Anita Smith, who wrote an article about her daughter's condition for a parenting website. "It's important for parents to know that they do not have to put their child through so many invasive tests and that surgery can be more successful if it's done earlier."

The next stage of research will focus on applying this approach to non-TSC patients, encouraging earlier considerations for surgery, reporting seizure outcomes after longer postoperative follow-ups, and assessing long-term developmental outcomes.

"UCLA is one of the few centers with the ability and experience to treat kids with this rare disorder," said senior author Dr. Gary Mathern, professor of neurosurgery at UCLA. "By developing improved technologies to help these young patients, we hope to make a difference in their lives."

Additional authors included Dr. Noriko Salamon, Dr. Raman Sankar and Dr. W. Donald Shields, of UCLA; Dr. Heidi E. Kirsch, Mary M. Mantle and Dr. Srinivasan S. Nagarajan, of UC San Francisco; and Lacey Kurelowech and Dr. Maung H. Aung, of the Scripps Clinic.

This study was supported by the National Institute of Neurological Disorders and Stroke of the National Institutes of Health.

Story Source:

Adapted from materials provided by University of California - Los Angeles.

http://www.sciencedaily.com/releases/2010/01/100129092018.htm

Soccer Practice May Significantly Reduce Blood Pressure in Inactive People

Experiments on both women and men further demonstrates that a regular game of soccer affects numerous cardiovascular risk factors such as maximal oxygen uptake, heart function, elasticity of the vascular system, blood pressure, cholesterol and fat mass far more than e.g. strength training and just as much if not more than running. (Credit: Mikal Schlosser)

ScienceDaily (Feb. 17, 2010) — A just published research experiment on inactive men with high blood pressure shows that just 3 months of soccer practise twice a week causes a significant fall in blood pressure, resting pulse rate, and percentage of body fat, and is more effective than the doctor's usual advice on healthy diet and exercise. Other parallel experiments on both women and men further demonstrates that a regular game of soccer affects numerous cardiovascular risk factors such as maximal oxygen uptake, heart function, elasticity of the vascular system, blood pressure, cholesterol and fat mass far more than e.g. strength training and just as much if not more than running.Each of the experiments was controlled randomized studies where the soccer groups were compared to other exercise groups and inactive controls. The soccer experiments are part of a large-scale research project on soccer and health carried out at the University of Copenhagen, four Danish University Hospitals, the Swiss Federal Institute of Technology and the Schulthess Clinic in Zurich.Project Leader and Associate Professor at the University of Copenhagen Peter Krustrup recaps the results: "Our research shows that soccer is a versatile and intense form of exercise that provides a positive effect on cardiovascular risk factors in a large group of untrained adult men and women," and continues: "Based on the results, soccer can be recommended as part of the treatment for high blood pressure and as broad-spectred prevention of cardiovascular diseases."

Small games, big gains

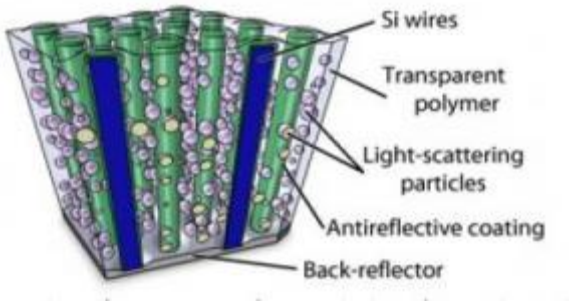
When untrained children, teens, adults and older people play soccer, their pulse rate remains high and they perform multiple intense actions like sprints, turns, kicks and tackles. "Our analyses also showed that the pulse rate and activity profile is the same in small-sided games where only 4, 6, 8 or 14 people play. In other words, it is very easy to obtain a combination of cardio and strength training with soccer," concludes KrustrupResearch partner Lars Juel Andersen from the Clinic of Sport Cardiology at Gentofte Hospital, Denmark, believes that the results are good news for the millions of people worldwide, suffering from high blood pressure: "It is well known that physical inactivity is a substantial risk factor in developing cardiovascular diseases in itself, but it is new that a pleasurable team sport like soccer is effective in treating high blood pressure." Furthermore, associate professor Peter Riis Hansen from Gentofte Hospital suggests that football may have other favourable effects on the vascular system, namely a reduction of arterial stiffness, which has been associated with improved cardiovascular outcomes.

Story Source:

Adapted from materials provided by University of Copenhagen.

http://www.sciencedaily.com/releases/2010/02/100202101249.htm

Highly Absorbing, Flexible Solar Cells With Silicon Wire Arrays Created



This is a schematic diagram of the light-trapping elements used to optimize absorption within a polymer-embedded silicon wire array. (Credit: Caltech/Michael Kelzenberg)

ScienceDaily (Feb. 17, 2010) — Using arrays of long, thin silicon wires embedded in a polymer substrate, a team of scientists from the California Institute of Technology (Caltech) has created a new type of flexible solar cell that enhances the absorption of sunlight and efficiently converts its photons into electrons. The solar cell does all this using only a fraction of the expensive semiconductor materials required by conventional solar cells.

"These solar cells have, for the first time, surpassed the conventional light-trapping limit for absorbing materials," says Harry Atwater, Howard Hughes Professor, professor of applied physics and materials science, and director of Caltech's Resnick Institute, which focuses on sustainability research.

The light-trapping limit of a material refers to how much sunlight it is able to absorb. The silicon-wire arrays absorb up to 96 percent of incident sunlight at a single wavelength and 85 percent of total collectible sunlight. "We've surpassed previous optical microstructures developed to trap light," he says.

Atwater and his colleagues -- including Nathan Lewis, the George L. Argyros Professor and professor of chemistry at Caltech, and graduate student Michael Kelzenberg -- assessed the performance of these arrays in a paper appearing in the February 14 advance online edition of the journal *Nature Materials*.

Atwater notes that the solar cells' enhanced absorption is "useful absorption."

"Many materials can absorb light quite well but not generate electricity -- like, for instance, black paint," he explains. "What's most important in a solar cell is whether that absorption leads to the creation of charge carriers."

The silicon wire arrays created by Atwater and his colleagues are able to convert between 90 and 100 percent of the photons they absorb into electrons -- in technical terms, the wires have a near-perfect internal quantum efficiency. "High absorption plus good conversion makes for a high-quality solar cell," says Atwater. "It's an important advance."

The key to the success of these solar cells is their silicon wires, each of which, says Atwater, "is independently a high-efficiency, high-quality solar cell." When brought together in an array, however, they're even more effective, because they interact to increase the cell's ability to absorb light.

"Light comes into each wire, and a portion is absorbed and another portion scatters. The collective scattering interactions between the wires makes the array very absorbing," he says.

This effect occurs despite the sparseness of the wires in the array -- they cover only between 2 and 10 percent of the cell's surface area.

"When we first considered silicon wire-array solar cells, we assumed that sunlight would be wasted on the space between wires," explains Kelzenberg. "So our initial plan was to grow the wires as close together as possible. But when we started quantifying their absorption, we realized that more light could be absorbed than predicted by the wire-packing fraction alone. By developing light-trapping techniques for relatively sparse wire arrays, not only did we achieve suitable absorption, we also demonstrated effective optical concentration -- an exciting prospect for further enhancing the efficiency of silicon-wire-array solar cells."

Each wire measures between 30 and 100 microns in length and only 1 micron in diameter. "The entire thickness of the array is the length of the wire," notes Atwater. "But in terms of area or volume, just 2 percent of it is silicon, and 98 percent is polymer."

In other words, while these arrays have the thickness of a conventional crystalline solar cell, their volume is equivalent to that of a two-micron-thick film.

Since the silicon material is an expensive component of a conventional solar cell, a cell that requires just one-fiftieth of the amount of this semiconductor will be much cheaper to produce.

The composite nature of these solar cells, Atwater adds, means that they are also flexible. "Having these be complete flexible sheets of material ends up being important," he says, "because flexible thin films can be manufactured in a roll-to-roll process, an inherently lower-cost process than one that involves brittle wafers, like those used to make conventional solar cells."

Atwater, Lewis, and their colleagues had earlier demonstrated that it was possible to create these innovative solar cells. "They were visually striking," says Atwater. "But it wasn't until now that we could show that they are both highly efficient at carrier collection and highly absorbing."

The next steps, Atwater says, are to increase the operating voltage and the overall size of the solar cell. "The structures we've made are square centimeters in size," he explains. "We're now scaling up to make cells that will be hundreds of square centimeters -- the size of a normal cell."

Atwater says that the team is already "on its way" to showing that large-area cells work just as well as these smaller versions.

Their research was supported by BP and the Energy Frontier Research Center program of the Department of Energy, and made use of facilities supported by the Center for Science and Engineering of Materials, a National Science Foundation Materials Research Science and Engineering Center at Caltech. In addition, Boettcher received fellowship support from the Kavli Neuroscience Institute at Caltech.

Story Source:

Adapted from materials provided by California Institute of Technology.

Journal Reference:

1. Kelzenberg et al. **Enhanced absorption and carrier collection in Si wire arrays for photovoltaic applications**. *Nature Materials*, 2010; DOI: 10.1038/nmat2635

http://www.sciencedaily.com/releases/2010/02/100216140259.htm

Stress and Trade-Offs Explain Life's Diversity: A New Model

Helene Muller-Landau's new model explaining the relationship between stressful environments and seed size helps to answer questions about how life's diversity arises and is maintained. (Credit: STRI)

ScienceDaily (Feb. 17, 2010) — Plants and people alike face critical choices as they reproduce: to make a few big, well-provisioned seeds -- or babies--or many small, poorly-provisioned ones. Different species make strikingly different choices, resulting in a great diversity of life forms: Darwin's "endless forms most beautiful.

Helene Muller-Landau, staff scientist at the Smithsonian Tropical Research Institute argues that these diverse strategies coexist because different levels of stress favor different choices.

"I love to figure out the reasons behind patterns I see in the forest," said Muller-Landau, who, as head of the HSBC Climate Partnership's effort to quantify carbon in forests worldwide, has traveled to forests in China, Malaysia, Ecuador, Panama and beyond. "The mathematical model I've developed explains why different plant species have different size seeds, and may also provide insight into the variation in offspring size and provisioning among animal species."

Coconut palms produce enormous seeds while figs produce tiny seeds. Muller-Landau wasn't happy with the textbook explanation that a tradeoff between competitive ability and seed arrival at a site accounts for this range of seed sizes: "The standard explanation is that big seeds beat out small seeds everywhere that the big seeds arrive -- but that just isn't always the case," she explains. "Big seeds don't necessarily do any better than small seeds when conditions are good. Where big seeds really have the advantage is in stressful conditions like shade or drought -- small seeds often can't make it at all at stressful sites. In contrast, small-seeded species have an advantage at favorable sites, just because they've got more seeds in the game."

"This simple, elegant theory, so well grounded in sound natural history, reminds me of the glory days of Robert MacArthur. It is a considerable advance in our understanding of the contrast between fugitive ("r") and equilibrium ("K") species and how they coexist," said Egbert Leigh, Smithsonian staff scientist.

Muller-Landau will speak in Panama on March 1 at Taking Stock, a conference sponsored by the Smithsonian Tropical Research Institute's Center for Tropical Forest Science and Earthwatch as part of the HSBC Climate Partnership. The conference will highlight the role that citizen scientists play in the partnership in gathering vast quantities of tree growth data from more than 30, independent forest dynamics monitoring plots in 25 countries, worldwide---data needed to answer questions about climate change and to address very basic biological questions that are essential to understanding life on earth.

Her "tolerance-fecundity" model, will be presented in the Early Online edition of the *Proceedings of the National Academy of Sciences* during the week of February 15.

Financial support from the HSBC Climate Partnership, a Packard Fellowship in Science and Engineering, the University of Minnesota and the U.S. National Science Foundation made this work possible.

Story Source:

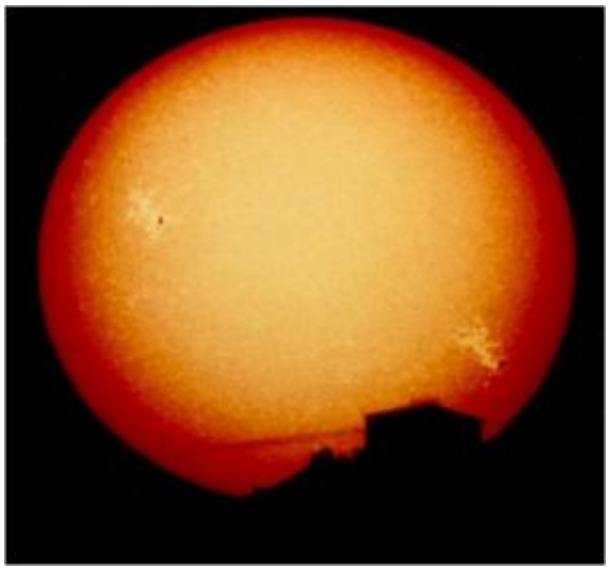
Adapted from materials provided by Smithsonian Tropical Research Institute, via EurekAlert!, a service of AAAS.

Journal Reference:

1. Helene C. Muller-Landau. **The tolerance-fecundity trade-off and the maintenance of diversity in seed size**. *Proceedings of the National Academy of Sciences*, [link]

http://www.sciencedaily.com/releases/2010/02/100216140400.htm

The Rhythm of Our Star



An image taken at dusk with TON (Taiwan oscillations of networks). The profile of the house is real. (Credit: Image courtesy of Instituto de Astrofisica de Canarias)

ScienceDaily (Feb. 17, 2010) — When we look at the Sun we cannot penetrate beyond its outer surface, the photosphere, which emits the photons that make up the radiation we can see. So how can we find out what is inside it?

Imagine a metal box. If it is a long way from us we cannot tell whether it is full or empty. Yet if we can tap it, the sound that we hear will tell us about its contents: it will be deeper if the box is full, and hollow-sounding if not. The human brain can tell one substance from another, and gain information about what it is, from the sound it makes.

Seismology works in a similar way: the way that waves travel through the interior of an object tells us about its structure. The "signature" of sound waves as they travel through a particular type of material is unique, and it changes as the material changes. This makes it easy to tell whether a sound is travelling through air or water, for example. The science of Seismology is not earthbound -- it has travelled to the stars. The methods it uses to gather information about stars are basically the same as they are on Earth. The first sound to be heard was the "song" of the Sun, because it is near to us and therefore easy to observe. That is how Helioseismology was born.

The brightest musical instrument

Our star, like others, is a gaseous incandescent sphere. We can compare the way it makes sounds to what happens when a clarinet is played. Blowing into the mouthpiece makes it vibrate, changing the air and creating sound waves that become trapped inside the instrument. The Sun does something similar. Turbulence in its outer layers produces changes in the gas and creates sounds, in the same way as the mouthpiece of a clarinet. The resulting sound waves (they originate from just below the visible surface in a layer some 200 or 300 kilometres thick, which is very thin given that the Sun's radius is 700,000 km) remain inside the star and resonate like a musical instrument.

Do you find this surprising? The stars provide natural cavities for sound waves, just like musical instruments. We cannot hear the sounds because they are in empty space and have nothing to travel through to reach us. However, as the gassy materials in a star are compressed and expand they make the star oscillate, and this oscillation can be detected. This is the visible manifestation of sound waves as they move across the interior of a star, and studying them gives us information about the layers it contains.

The proximity of the Sun, which is just 150 million kilometres away, means that we can detect not only waves that are travelling right across it but also much more localised waves with very short wavelengths. Analysing these lets us observe the movement of plasma in the first few thousand kilometres beneath the surface, to see how it rises, falls and is altered by the Sun's magnetic field.

Sunspots are one of the best known features of the Sun, but until now little has been known about the activity that takes place beneath them. It was known only that sunspots are magnetic phenomena, are a reliable indicator of solar activity, and that they follow an eleven year cycle during which they increase and decrease in size. When the Sun is very active it gives off large amounts of matter as electrically charged particles that can be hazardous to space missions, damage communications satellites and cause power cuts. On a less practical level, they also cause the beautiful polar auroras on Earth.

The Sun's back

Our star rotates on its axis every 27 days, which means that part of it is always hidden from observers on Earth. "Seeing" what happens on the Sun's back and building models to forecast the composition of the regions we can see is important for our understanding of the effects of activity in the Sun. Seismology provides us with a tool for this. Using an observation technique known as *farside* we can determine the position of sunspots on the hidden side of the Sun. Irene González-Hernández, a scientist at the NOAO (*National Optical Astronomical Observatory*) said during her address to the 4th International HELAS Conference in Lanzarote (Canary Islands) that: "activity in the farthest regions of the Sun can be observed by looking at waves in the nearer regions. We make a model of the way these waves are propagated from the *farside* to the *frontside* and compare it to what we are observing. When the data being received do not conform to the model we know that the waves are passing through a zone that has a strong magnetic field or sunspot."

González-Hernández also said that data from the GONG (*Global Oscillation Network Group*) telescope network, which has seven stations across the globe to observe the Sun continuously without stopping at "nightfall," is used for this. The first network of telescopes acting in "relay" was the University of Birmingham's BiSON network in the 1980s. BiSON's first instrument, which is still in operation, was built in Tenerife in 1977.

Another instrument used for *farside* observation is the MDI (*Michelson Doppler Imager)* on the SoHO (*Solar and Heliospheric Observatory*) satellite, which has been the most successful mission ever launched to study the Sun and is a product of collaboration between the European and North American space agencies (ESA and NASA). MDI will soon have some help: next week NASA will launch the SDO (*Solar Dynamics Observatory*), with the HMI (*Helioseismic and Magnetic Imager*) instrument on board.

The most significant advances in the SDO over SoHO, or rather the advantages of the HMI over the MDI, were spelt out in Lanzarote by Richard Bogart of Stanford University: "higher resolution, wider coverage and the ability to measure the magnetic fields." For the first time we will continuously observe the whole of the Sun, which will allow us to track whole-system structures as they develop: from below the surface, through the surface fields and the structures of the corona.

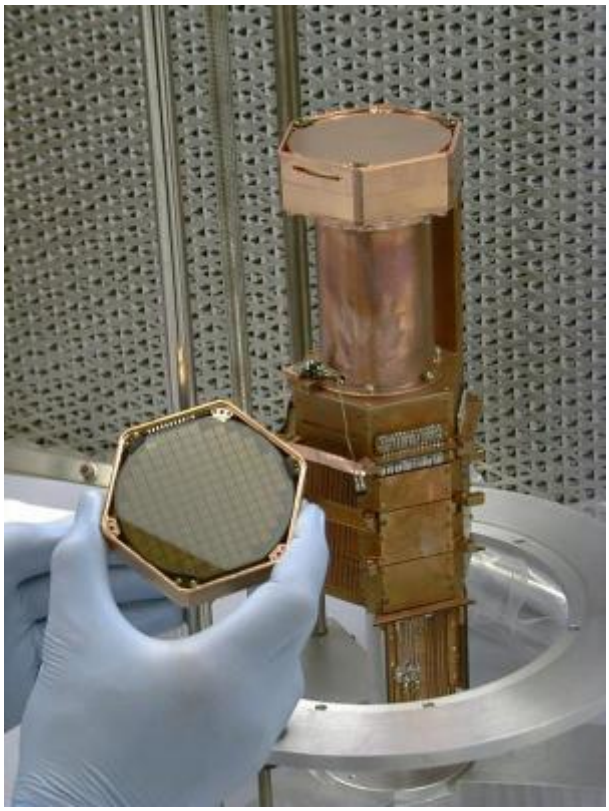
Since its beginnings thirty years ago, Helioseismology has been listening to the great mass of resonances that is the Sun. The Sun's properties never seem to stop "changing" as we discover more about it. Is it typical of other stars? In many ways it seems not, but to know for certain we will have to wait to see what research tells us in the years ahead.

Story Source:

Adapted from materials provided by Instituto de Astrofisica de Canarias, via AlphaGalileo.

http://www.sciencedaily.com/releases/2010/02/100215100517.htm

Particle May Be Leading Candidate for Mysterious Dark Matter



Closeup of a CDMS detector, made of crystal germanium. (Credit: DOE/Fermi National Accelerator Laboratory)

ScienceDaily (Feb. 16, 2010) — Physicists may have glimpsed a particle that is a leading candidate for mysterious dark matter but say conclusive evidence remains elusive.

A 9-year search from a unique observatory in an old iron mine 2,000 feet underground has yielded two possible detections of weakly interacting massive particles, or WIMPs. But physicists, who include two University of Florida researchers, say there is about a one in four chance that the detections were merely background noise -- meaning that a worldwide hunt involving at least two dozen different observatories and hundreds of scientists will continue.

"With one or two events, it's tough. The numbers are too small," said Tarek Saab, a UF assistant professor and one of dozens of physicists participating in the Cryogenic Dark Matter Search II, or CDMS II, experiment based in the Soudan mine in Northern Minnesota.

A paper about the results is set to appear February 11 in *Science* Express, the journal *Science*'s Web site for selected papers that appear in advance of the print publication.

Scientists recognized decades ago that the rotational speed of galaxies and the behavior of galaxy clusters could not be explained by the traditional forces of gravity due to the mass of visible stars alone. Something else -- something invisible, undetectable yet extremely powerful -- had to exert the force required to cause the galaxies' more-rapid-than-expected rotational speed and similar anomalous observations.

What came to be known as "dark matter" -- dark because it neither reflects nor absorbs light in any form, visible or other -- is now estimated to comprise as much as 23 percent of the universe. But despite abundant evidence for its influence, no one has ever observed dark matter directly.

There are several possibilities for the composition of this mysterious, omnipresent matter. Particle physics theory points toward WIMPs as one of the most likely candidates.

WIMPs are "weakly interacting" because, although their masses are thought to be comparable to the masses of standard atomic nuclei, they have little or no effect on ordinary matter.

Among other things, that makes them extremely difficult to detect.

However, scientists believe WIMPs should occasionally "kick" or bounce off standard atomic nuclei, leaving behind a small amount of energy that should be possible to detect.

The CDMS II observatory is located a half-mile underground beneath rock that blocks most particles, such as those accompanying cosmic rays. At the observatory's heart are 30 hockey-puck-sized germanium and silicon detectors cryogenically frozen to negative 459.58 Fahrenheit, just shy of absolute zero. In theory, WIMPs would be among the few particles that make it all the way through the earth and rock. They would then occasionally kick the atoms on these detectors, generating a tiny amount of heat, a signal that would be observed and recorded on the experiment's computers.Durdana Balakishiyeva, a postdoctoral associate in physics at UF, and Saab have participated in the analysis of data produced by the experiment as well as simulations of the detectors' response. Beginning in 2007 they have helped to test many of the detectors at the UF campus in Gainesville which are being used in the successor SuperCDMS experiment. The UF tests involved cooling and operating the detectors just as they are operated in Minnesota to verify that they were up to par.

The 15 institutions participating in CDMS II gathered data from 2003 to 2009. Observers recorded the two possible WIMP events in 2007, one on Aug. 8 and the second on Oct. 27. Scientists had estimated that five detections would be sufficient to confirm WIMPs -- meaning that the two fell short, according to the CDMS. But while the two detections may not be conclusive, they do help to set more stringent values on the WIMPs' interaction with subatomic particles.

"Up until now, not only us, but everybody was operating without statistics -- we were blind in that sense," Balakishiyeva said. "But now we can speak of statistics in some way."

At the very least, the finding helps to eliminate some theories about dark matter -- raising the profile of the WIMP and potentially accelerating the race to detect it."Many people believe we are extremely close -- not just us, but other experiments," Saab said. "It is expected or certainly hoped that in the next five years or so, someone will see a clear signal."

Story Source:

Adapted from materials provided by University of Florida.

Journal Reference:

1. The CDMS II Collaboration. **Dark Matter Search Results from the CDMS II Experiment**. *Science*, 2010; DOI: 10.1126/science.1186112

http://www.sciencedaily.com/releases/2010/02/100211141146.htm

Free Trade, Loss of Support Systems Crippling Food Production in Africa

De-husking local rice. (Credit: Image courtesy of Oregon State University)

ScienceDaily (Feb. 16, 2010) — Despite good intentions, the push to privatize government functions and insistence upon "free trade" that is too often unfair has caused declining food production, increased poverty and a hunger crisis for millions of people in many African nations, researchers conclude in a new study.

Market reforms that began in the mid-1980s and were supposed to aid economic growth have actually backfired in some of the poorest nations in the world, and just in recent years led to multiple food riots, scientists report Feb 15 in *Proceedings of the National Academy of Sciences*.

"Many of these reforms were designed to make countries more efficient, and seen as a solution to failing schools, hospitals and other infrastructure," said Laurence Becker, an associate professor of geosciences at Oregon State University. "But they sometimes eliminated critical support systems for poor farmers who had no car, no land security, made $1 a day and had their life savings of $600 hidden under a mattress.

"These people were then asked to compete with some of the most efficient agricultural systems in the world, and they simply couldn't do it," Becker said. "With tariff barriers removed, less expensive imported food flooded into countries, some of which at one point were nearly self-sufficient in agriculture. Many people quit farming and abandoned systems that had worked in their cultures for centuries."

These forces have undercut food production for 25 years, the researchers concluded. They came to a head in early 2008 when the price of rice -- a staple in several African nations -- doubled in one year for consumers who spent much of their income solely on food. Food riots, political and economic disruption ensued.

The study was done by researchers from OSU, the University of California at Los Angeles and Macalester College. It was based on household and market surveys and national production data.

There are no simple or obvious solutions, Becker said, but developed nations and organizations such as the World Bank or International Monetary Fund need to better recognize that approaches which can be effective in more advanced economies don't readily translate to less developed nations.

"We don't suggest that all local producers, such as small farmers, live in some false economy that's cut off from the rest of the world," Becker said.

"But at the same time, we have to understand these are often people with little formal education, no extension systems or bank accounts, often no cars or roads," he said. "They can farm land and provide both food and jobs in their countries, but sometimes they need a little help, in forms that will work for them. Some good seeds, good advice, a little fertilizer, a local market for their products."

Many people in African nations, Becker said, farm local land communally, as they have been doing for generations, without title to it or expensive equipment -- and have developed systems that may not be advanced, but are functional. They are often not prepared to compete with multinational corporations or sophisticated trade systems. The loss of local agricultural production puts them at the mercy of sudden spikes in food costs around the world. And some of the farmers they compete with in the U.S., East Asia and other nations receive crop supports or subsidies of various types, while they are told they must embrace completely free trade with no assistance.

"A truly free market does not exist in this world," Becker said. "We don't have one, but we tell hungry people in Africa that they are supposed to."

This research examined problems in Gambia and Cote d'Ivoire in Western Africa, where problems of this nature have been severe in recent years. It also looked at conditions in Mali, which by contrast has been better able to sustain local food production -- because of better roads, a location that makes imported rice more expensive, a cultural commitment to local products and other factors.

Historically corrupt governments continue to be a problem, the researchers said."In many African nations people think of the government as looters, not as helpers or protectors of rights," Becker said. "But despite that, we have to achieve a better balance in governments providing some minimal supports to help local agriculture survive."

An emphasis that began in the 1980s on wider responsibilities for the private sector, the report said, worked to an extent so long as prices for food imports, especially rice, remained cheap. But it steadily caused higher unemployment and an erosion in local food production, which in 2007-08 exploded in a global food crisis, street riots and violence. The sophisticated techniques and cash-crop emphasis of the "Green Revolution" may have caused more harm than help in many locations, the study concluded.

Another issue, they said, was an "urban bias" in government assistance programs, where the few support systems in place were far more oriented to the needs of city dwellers than their rural counterparts.Potential solutions, the researchers concluded, include more diversity of local crops, appropriate tariff barriers to give local producers a reasonable chance, subsidies where appropriate, and the credit systems, road networks, and local mills necessary to process local crops and get them to local markets.

Story Source:

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

http://www.sciencedaily.com/releases/2010/02/100215174136.htm

'Fingerprinting' Method Reveals Fate of Mercury in Arctic Snow

Icebergs of Northern Canada. A study by University of Michigan researchers offers new insight into what happens to mercury deposited onto Arctic snow from the atmosphere. (Credit: iStockphoto/Chris Ronneseth)

ScienceDaily (Feb. 16, 2010) — A study by University of Michigan researchers offers new insight into what happens to mercury deposited onto Arctic snow from the atmosphere.

The work also provides a new approach to tracking mercury's movement through Arctic ecosystems.

Mercury is a naturally occurring element, but some 2000 tons of it enter the global environment each year from human-generated sources such as coal-burning power plants, incinerators and chlorine-producing plants.

"When released into the atmosphere in its reduced form, mercury is not very reactive. It can float around in the atmosphere as a gas for a year or more, and it's not really an environmental problem at the concentrations at which it occurs," said Joel Blum, the John D. MacArthur Professor of Geological Sciences.

But once mercury is oxidized, through a process that involves sunlight and often the element bromine, it becomes very reactive. Deposited onto land or into water, the mercury is picked up by microorganisms, which convert some of it to methylmercury, a highly toxic form that builds up in fish and the animals that eat them.

As bigger animals eat smaller ones, the methylmercury is concentrated. In wildlife, exposure to methylmercury can interfere with reproduction, growth, development and behavior and may even cause death. Effects on humans include damage to the central nervous system, heart and immune system. The developing brains of young and unborn children are especially vulnerable.

The research is described in a paper published online Feb. 7 in the journal *Nature Geoscience.*

In the Arctic, mercury remains in its benign gaseous form through the dark winter, because there's no sunlight to drive oxidation and little bromine to catalyze the process. But in polar springtime, that all changes. As sea ice breaks up, water vapor rises in great clouds through the openings in the ice, bringing with it bromine from the sea water. The bromine enters the atmosphere, where it conspires with sunlight to convert mercury gas into the reactive form. The activated mercury sticks to snowflakes and ice crystals in the air and travels with them onto the surface of the snow.

This leads to what's known as a mercury depletion event. The normally steady levels of mercury in the atmosphere quickly drop to near zero, as concentrations of mercury on the surface of the snow rise to extremely high levels.

"When we first started observing these events, we didn't know how much of that mercury returned back to the atmosphere, so the high level of mercury in snow was a great concern," Blum said. "But the more we learned, the more we realized that the sunlight shining on the snow typically will cause much of the oxidized mercury to become reduced and return to the atmosphere as a gas. And it turns out that its re-release to the atmosphere has a striking "fingerprint' that we can use to study the progress of this reaction through time."

The fingerprint is the result of a natural phenomenon called isotopic fractionation, in which different isotopes (atoms with different numbers of neutrons) of mercury react to form new compounds at slightly different rates. In one type of isotopic fractionation, mass-dependent fractionation (MDF), the differing rates depend on the masses of the isotopes. In mass-independent fractionation (MIF), the behavior of the isotopes depends not on their absolute masses but on whether their masses are odd or even.

In the work described in the Nature Geoscience paper, the researchers confirmed, through sample collection and experiments, that MIF occurs during the sunlight-driven reactions in snow, resulting in a characteristic MIF fingerprint that is absent in atmospheric mercury.

"This finding allowed us to use the MIF fingerprint to estimate how much mercury was lost from the snowpack and how much remained behind, with the potential to enter Arctic ecosystems," said U-M graduate student Laura Sherman, the paper's first author. "Our experiments showed that a significant portion of mercury deposited to snow was re-emitted. Any mercury that is not re-emitted is likely to retain the unique fingerprint, so we hope future researchers will be able to use our discovery to track mercury through Arctic ecosystems."

Sherman and Blum's coauthors on the paper are former U-M graduate student Kelsey Johnson; Gerald Keeler and James Barres of the U-M Air Quality Laboratory; and Thomas A. Douglas of the Cold Regions Research and Engineering Laboratory in Fort Wainwright, Alaska.

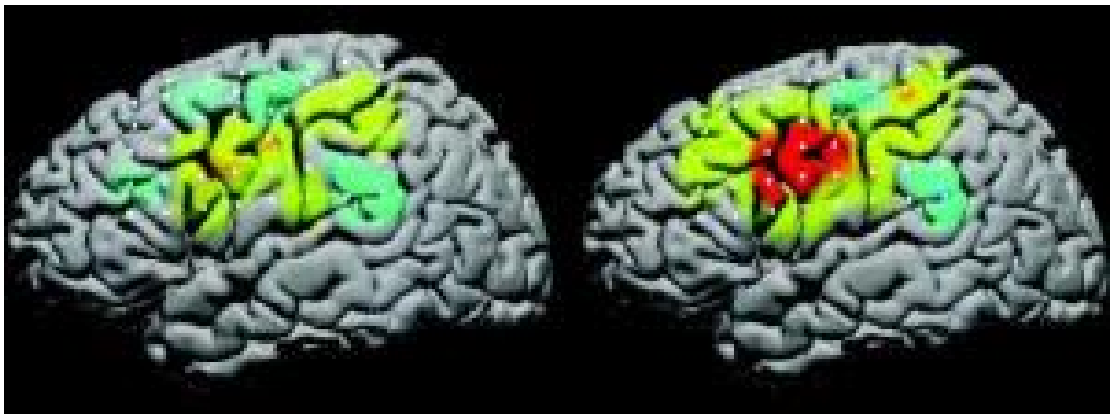
The research was funded by the National Science Foundation and the Office of Naval Research.

Story Source:

Adapted from materials provided by University of Michigan.

http://www.sciencedaily.com/releases/2010/02/100210172225.htm

Brain-Controlled Cursor Doubles as a Neural Workout



Left: Brain signals in the first trial, when the subject was able to hit the target just under half the time. Right: Brain activity after about 10 minutes of training, when the subject could hit the target with 94 percent accuracy. The signal is stronger than in the earlier trial, and stronger even than when the subject actually performed the imagined movement. (Credit: Image courtesy of University of Washington)

ScienceDaily (Feb. 16, 2010) — Harnessing brain signals to control keyboards, robots or prosthetic devices is an active area of medical research. Now a rare peek at a human brain hooked up to a computer shows that the two can adapt to each other quickly, and possibly to the brain's benefit.

Researchers at the University of Washington looked at signals on the brain's surface while using imagined movements to control a cursor. The results, published this week in the *Proceedings of the National Academy of Sciences*, show that watching a cursor respond to one's thoughts prompts brain signals to become stronger than those generated in day-to-day life.

"Bodybuilders get muscles that are larger than normal by lifting weights," said lead author Kai Miller, a UW doctoral student in physics, neuroscience and medicine. "We get brain activity that's larger than normal by interacting with brain-computer interfaces. By using these interfaces, patients create super-active populations of brain cells."

The finding holds promise for rehabilitating patients after stroke or other neurological damage. It also suggests that a human brain could quickly become adept at manipulating an external device such as a computer interface or a prosthetic limb.

The team of computer scientists, physicists, physiologists and neurosurgeons studied eight patients awaiting epilepsy surgery at two Seattle hospitals. Patients had electrodes attached to the surface of their brains during the week leading up to the surgery and agreed to participate in research that would look at connecting brains to a computer.

Asking people to imagine doing a movement -- such as moving their arm -- is commonly done to produce a brain signal that can be used to control a device. But how that process works is poorly understood.

"A lot of the studies in this field are in non-human primates," Miller said. "But how do you ask an animal to imagine doing something? We don't even know that they can." The researchers first recorded brain patterns when human subjects clenched and unclenched a fist, stuck out a tongue, shrugged their shoulders or said the word "move."

Next, the scientists recorded brain patterns when subjects imagined performing the same actions. These patterns were similar to the patterns for actual action but much weaker, as expected from previous studies.

Finally, the researchers looked at signals when subjects imagined performing the action and those brain signals were used to move a cursor toward a target on a computer screen. After less than 10 minutes of practice, brain signals from imagined movement became significantly stronger than when actually performing the physical motion.

"People have been looking at imagined movements as a way to control computers for a long time. This study provides a glimpse of the underlying neural machinery," said co-author Rajesh Rao, a UW associate professor of computer science and engineering who is Miller's neuroscience dissertation advisor.

"The rapid augmentation of activity during this type of learning bears testimony to the remarkable plasticity of the brain as it learns to control a non-biological device," Rao said.

After less than 10 minutes of training, two of the subjects also reported they no longer had to imagine moving the body part and could just think about moving the cursor.

"The ability of subjects to change the signal with feedback was much stronger than we had hoped for," said co-author Dr. Jeffrey Ojemann, a UW professor of neurological surgery. "This is likely to have implications for future prosthetic work."

The new findings also provide clues about which brain signals to tap. Researchers compared the patterns in low-frequency signals, usually used to control external devices, and high-frequency signals, typically dismissed as noise. They discovered that the high-frequency signals are more specific to each type of movement. Because each one occupies a smaller portion of the brain, several high-frequency signals could be tapped simultaneously to control more sophisticated devices.

Rao's group has used electrodes on the surface of the scalp to record low-frequency brain signals for brain-computer communication. His group will now try using such non-invasive methods to harness high-frequency signals.

The research was funded by the National Science Foundation, the National Institutes of Health, NASA's graduate student research program and the National Institute of General Medical Sciences' medical scientist training program. Other co-authors are UW physiology and biophysics professor Eberhard Fetz, UW physics professor Marcel den Nijs and Gerwin Schalk at the New York State Department of Health.

Story Source:

Adapted from materials provided by University of Washington.

Journal Reference:

1. Kai J. Miller, Gerwin Schalk, Eberhard E. Fetz, Marcel den Nijs, Jeffrey G. Ojemann, and Rajesh P.N. Rao. **Cortical activity during motor execution, motor imagery, and imagery-based online feedback**. *Proceedings of the National Academy of Sciences*, (in press) DOI: 10.1073/pnas.0913697107

http://www.sciencedaily.com/releases/2010/02/100215174206.htm

Children More Likely to Visit the Dentist If Their Parents Do, Too

Doctor demonstrating proper dental care. (Credit: iStockphoto/Kristian Sekulic)

ScienceDaily (Feb. 16, 2010) — Whether or not children receive regular dental care is strongly associated with their parents' history of seeking dental care. A new report to appear in the journal *Pediatrics*, which has been released online, is the first to analyze the relationship between parents' and childrens' dental visits in a nationally represntative sample.

"When parents don't see the dentist, their children are much less likely to see the dentist," says Inyang Isong, MD, MPH, of the MassGeneral Hospital for Children (MGHfC) Center for Child and Adolescent Health Policy, the study's lead author. "We also found that the children of parents who have put off their own dental care for financial reasons are more likely to have their care deferred due to cost as well. It looks like strategies to promote oral health should focus on the whole family."

The study's authors note that dental caries -- tooth decay -- is of one of the most prevalent childhood diseases and is particularly common among minority and low-income children. Previous studies have associated factors including insurance coverage, parents' income and education, and the availability of dental care in the local community with the likelihood that children will have regular dental visits.

Earlier investigations of the impact of parents' accessing dental care focused on particular demographic groups. In order to see whether associations from those studies applied more broadly, the current investigation analyzed data from the 2007 National Health Interview Survey and its Child Health Supplement, which are designed to collect basic health and demographic information, along with answers to questions on health topics of current interest, from a cross section of the U.S. population.

Survey responses including data regarding dental visits for both a child and parent in the same household was available for around 6,100 matched pairs. Among parents who reported seeing a dentist during the preceding year, 86 percent of children had also seen a dentist; but only 64 percent of the children of parents with no recent dental visit had seen a dentist during the previous 12 months. In addition, among parents who put off their own dental care because of financial considerations, 27 percent of their children

also had dental care deferred. In contrast, only 3 percent of children whose parents had not put off their own care care had their dental care deferred.

"Even when children are covered by medical insurance, it appears that financial barriers are influencing parents' decisions about accessing dental care for their children," says Isong, a clincal fellow at MGHfC. "We're now in the process of looking at the impact of dental insurance -- something not addressed by the NHIS -- and other enabling resources on the relationship between parents' and children's receipt of dental care."

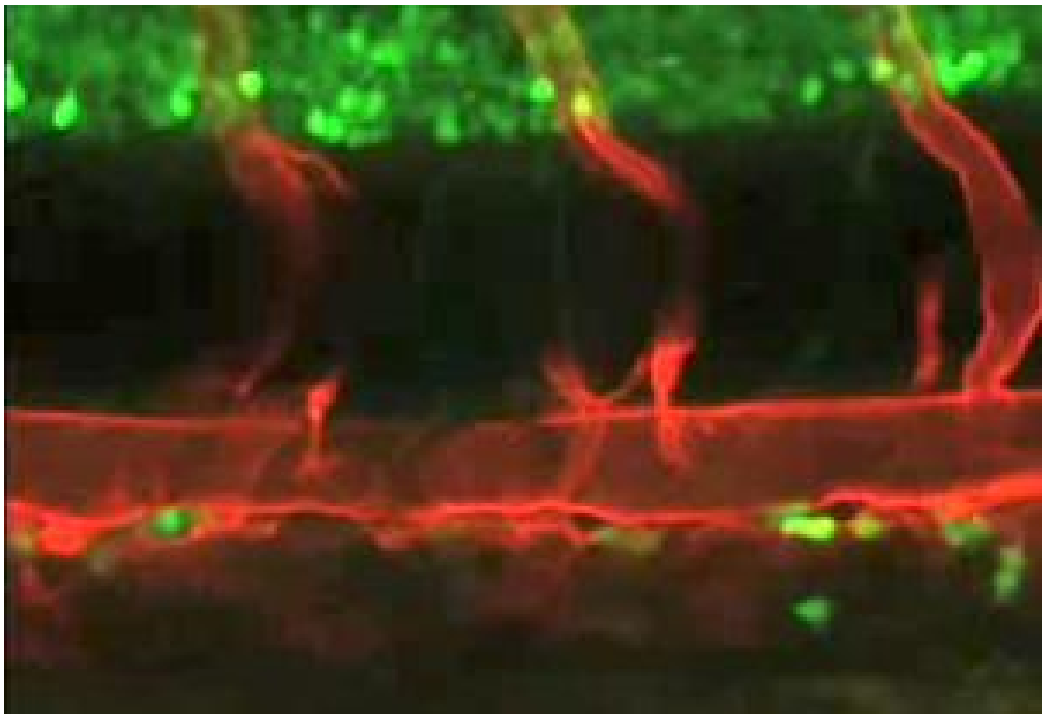
James Perrin, MD, of the MGHfC Center for Child and Adolescent Health Policy is senior author of the Pediatrics paper. Additional co-authors are Karen Kuhlthau, PhD, and Jonathan Winickoff, MD, MPH, MGHfC; Katharine Zuckerman, MD, MPH, Oregon Health and Science University; and Sowmya Rao, PhD, MGH Biostatistics Center.

Story Source:

Adapted from materials provided by Massachusetts General Hospital.

http://www.sciencedaily.com/releases/2010/02/100201091634.htm

Biologists Image Birth of Blood-Forming Stem Cells in Embryo



Biologists at UC San Diego have located the origin of blood stem cells, or hematopoetic cells, in the zebra fish embryo. (Credit: Any re-use must include complete credits.)

ScienceDaily (Feb. 16, 2010) — Biologists at UC San Diego have identified the specific region in vertebrates where adult blood stem cells arise during embryonic development.

Their discovery, which appears in a paper in this week's early online edition of the journal *Nature,* is a critical first step for the development of safer and more effective stem cell therapies for patients with leukemia, multiple myeloma, anemia and a host of other diseases of the blood or bone marrow.

The researchers say their time-lapse imaging of the process, by which primitive embryonic tissues first produce the parent stem cells that produce all adult blood cells over the life of an individual, should help guide future efforts to repair and replace this cell population for therapeutic purposes.

Current transplantation therapies rely on the infusion of donor stem cells into a patient's bone marrow to generate new, healthy blood cells without disease. But that procedure is often risky and can result in fatal complications, due in part to "graft-versus-host disease," in which transplanted cells react against foreign tissues of the recipient. One means of circumventing this immune rejection problem would be to generate hematopoietic stem cells, or HSCs, using the patient's own precursor cells. Such cells would be perfectly genetically matched, but in order to generate such cells, scientists must first understand the molecular processes that underlie specification of HSCs.

"If we could generate healthy HSCs from patients and transplant them back into their own bone marrow, it would eliminate many complications," said David Traver, an assistant professor of biology who headed the research team.

"Our findings are an important step toward this goal because they provide a better understanding of how HSCs, the cell type responsible for the clinical benefits of bone marrow transplants, are first specified during development," he said. "This improved understanding will aid efforts to instruct pluripotent embryonic stem cells (ESCs), the stem cells that can produce all types of tissue-specific stem cells in the

body, to make HSCs; something that is not currently possible. In other words, we are one step closer now to understanding how to clinically generate HSCs for cellular replacement therapies from ESCs."

Traver and his colleagues, who included Julien Bertrand, a postdoctoral fellow in his laboratory, Neil Chi, an assistant professor of medicine at UCSD and Didier Stainier, a professor of biochemistry at UC San Franscisco, made their discoveries in zebrafish, a model laboratory organism for geneticists in which embryos are transparent, allowing the researchers to observe and track individual stem cells with a microscope.

A number of earlier studies using indirect observation had led to the idea that a particular region of the embryo surrounding the dorsal aorta, an early blood vessel, produced the first HSCs, but until now no one had been able to directly visualize the process in living animals.

"Indeed a number of conflicting studies had proposed different or earlier sites of origin, making the exact location where HSCs develop controversial," said Traver. "Using zebrafish embryos with fluorescently labeled tissues, we were able to demonstrate that HSCs arise directly from cells lining the floor of the dorsal aorta by imaging the process in living embryos."

The UCSD researchers also documented the stepwise formation of HSCs from "hemogenic" aortic endothelium and showed, by expressing a permanent fluorescent marker in these cells, that all adult blood and immune cell types derive from aortic endothelium of the early embryo.

"Our studies suggest that transition through a hemogenic endothelial intermediate is a requisite step for hematopoietic stem cell formation," said Traver. "Based upon the high degree of evolutionary similarity in the regulation of HSC formation and later blood maturation in other vertebrates, this finding almost certainly applies to the development of HSCs in humans. These findings should, together with recent breakthroughs in making induced pluripotent stem cells (iPSCs), the functional equivalent of patient-specific ESCs, in principle allow the generation of replacement HSCs from unrelated adult tissues. This would enable repopulation of a patient's hematopoietic system with his own, disease-free HSCs to avoid immune rejection."

Other researchers involved in the study included Buyung Santoso and Shutian Teng of UCSD. The study was supported by grants from the National Institutes of Health and the California Institute for Regenerative Medicine.

Story Source:

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

http://www.sciencedaily.com/releases/2010/02/100214143125.htm

Most Patients Gain Weight After Knee Replacement Surgery

Patients need to get out of the house to gain the benefit from knee replacement surgery and avoid weight gain. Paul Baumbach, a patient at UD's Physical Therapy Clinic, plays tennis at Elkton Indoor Tennis as part of his exercise program for his new right knee. (Credit: Photo by Duane Perry and Ambre Alexander)

ScienceDaily (Feb. 16, 2010) — You'd think folks who've had knee replacement surgery -- finally able to walk and exercise without pain -- would lose weight instead of put on pounds, but surprisingly that's not the case, according to a University of Delaware study.

Researchers Joseph Zeni and Lynn Snyder-Mackler in the Department of Physical Therapy in UD's College of Health Sciences found that patients typically drop weight in the first few weeks after total knee arthroplasty (TKA), but then the number on the scale starts creeping upward, with an average weight gain of 14 pounds in two years.

The study, which was sponsored by the National Institutes of Health, is reported in the Jan. 15 online edition of *Osteoarthritis and Cartilage*, the official journal of the Osteoarthritis Research Society International.

The research involved 106 individuals with end-stage osteoarthritis who had knee replacement surgery, and an age-matched, healthy control group of 31 subjects who did not have surgery. Height, weight, quadriceps strength, and self-perceived functional ability were measured during an initial visit to UD's Physical Therapy Clinic, and at a follow-up visit two years later.

"We saw a significant increase in body mass index (BMI) over two years for the surgical group, but not the control group," says Zeni, a research assistant professor at UD. "Sixty-six percent of the people in the surgical group gained weight over the two years -- the average weight gain was 14 pounds."

Those who had the knee replacement surgery started out heavier and ended heavier than the control group. The weaker the surgery patients were, as measured by the strength of the quadriceps, the more weight they gained, Zeni notes.

"These findings are making us re-think the component after total knee surgery and of patients not being in a routine of moving around," says Snyder-Mackler, Alumni Distinguished Professor of Physical Therapy at UD.

She notes that it's critical that people not wait too long to have a knee replaced because their functional level going into surgery typically dictates their functional level after surgery.

Gaining weight after one knee replacement is worrisome because it could jeopardize the patient's other knee. Between 35-50 percent will have surgery on the other side within 10 years, Snyder-Mackler says.

The researchers note that weight gain after a knee replacement needs to be treated as a separate concern and integrated into post-operative care through a combination of approaches, including nutritional counseling to help patients with portion control, and more emphasis on retraining patients with new knees to walk normally.

"For physical therapists and surgeons, the common thinking is that after a patient's knee has been replaced, that patient will be more active," says Snyder-Mackler. "But the practices and habits these patients developed to get around in the years prior to surgery are hard to break, and often they don't take advantage of the functional gain once they get a new knee," she notes.

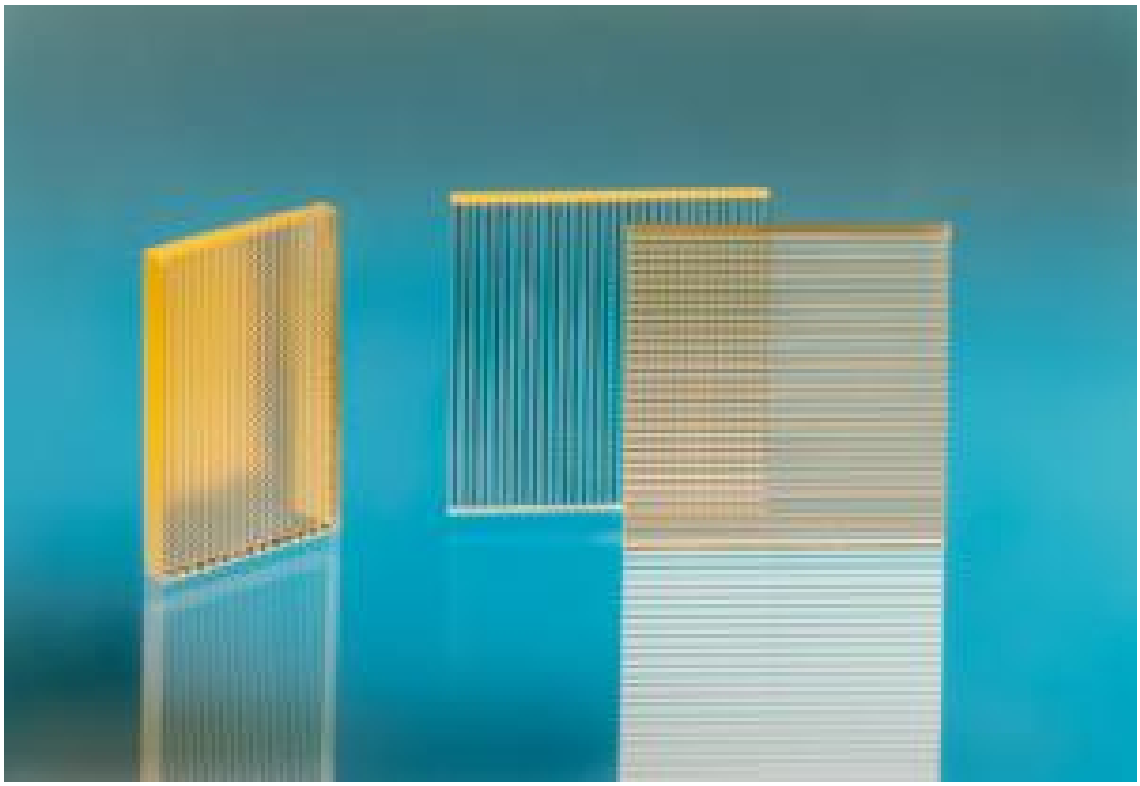
"We need to re-train patients with new knees to walk more normally and more systematically. And we need to encourage more community participation," Snyder-Mackler adds. "If you're not getting out of the house, you won't gain the benefit. We need people with new knees to get out there -- with the help of their family, their friends, and the community at large."

Story Source:

Adapted from materials provided by University of Delaware. Original article written by Tracey Bryant.

http://www.sciencedaily.com/releases/2010/01/100129151758.htm

Nano for the Senses



Micro-optical elements. (Credit: Image courtesy of Fraunhofer-Gesellschaft)

ScienceDaily (Feb. 16, 2010) — A mystical glow emanates from the display case. A white light appears out of nowhere. And a light source is invisible -- at least at first glance. Only upon close examination does the source of the apparently supernatural illumination become visible: a light diode, smaller than a pinhead, passes through thousands of infinitesimal lens structures measuring only a few hundred nanometers, et voilà: beaming white light.

"For a long time, producing white light with no peripheral color effects was an almost unsolvable technical problem," explains Dr. Michael Popall of the Fraunhofer Institute for Silicate Research ISC in Wurzburg. "White light is produced by mixing the complementary colors red, green and blue. Undesirable refraction occurs with conventional beamer technology, resulting in colored streaks on the periphery of the projection."

This technology -- which researchers will present from February 17 to 19 at nano tech 2010 in Tokyo, Hall 3.03 Booth F-14-1 -- delivers not only brilliant color, but also pure white: "The tiniest of red, blue and green light diodes on the most condensed space produce the light, which is then bundled and homogenized by the nano-structured ORMOCER® optics," illustrates Popall, who was deeply involved in the development of the material.

"ORMOCER®s are an ideal material for the production of microoptics," concludes the researcher. "They are not only superior light conductors, but are also easy to process -- not as brittle as glass, and not as pliant as polymers." In fact, ORMOCER®s are a hybrid of inorganic and organic components that are networked at the molecular level. This material makes it possible to realize things inconceivable even a couple of years ago: Ultra-flat and ultra-small optics for micro-cameras or beamers that fit into a pants pocket. The design of the new ORMOCER® optics, incidentally, was developed by experts at the Fraunhofer Institute for Applied Optics and Precision Engineering IOF in Jena. Popall: "Thanks to close collaboration among chemists at ISC and the physicists and engineers at IOF, we have succeeded in

developing ORMOCER® tandem arrays with two-sided and symmetrically arranged micro-lens configurations, which allow the light from light diodes to be projected with pinpoint accuracy and without refraction errors." The new technology has meanwhile reached the verge of market introduction.

Nanotechnology not only puts an entirely new dimension before the eye, it also makes audible things that no ear could ever perceive before: like changes in temperature. A new varnish developed by researchers at the Fraunhofer Institute for Engineering and Automation IPA ensures that surfaces emit sound if they become warmer or cool off. The trick: carbon nano-tubes embedded in the varnish that conduct electricity: If a surface is coated with this varnish, then it can be heated up by application of an electric current. This change in temperature is audible because the warming up surface makes the air around it vibrate.

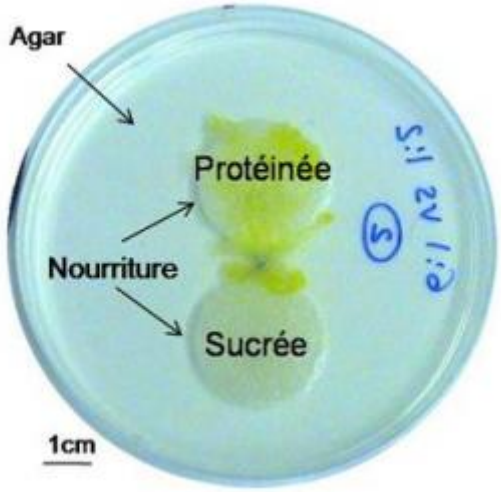
"And this is only one of a myriad of conceivable innovative applications. The surface coating is likewise capable of heating large surfaces and surfaces of complex shape, and in the future, conceivably it can be used as a multifunctional coating for heating, or as a resistance sensor, or as a coating for color displays," says Ivica Kolaric, head of department at IPA.

Story Source:

Adapted from materials provided by Fraunhofer-Gesellschaft.

http://www.sciencedaily.com/releases/2010/02/100202111746.htm

Even Single-Celled Organisms Feed Themselves in 'Smart' Manner



Social amoebae extending over two different nutrient sources so as to reconstitute an optimal diet (with twice as much protein as sugar). (Credit: Copyright Audrey Dussutour / CNRS 2010)

ScienceDaily (Feb. 15, 2010) — How does a single-celled organism, one of the simplest life forms on Earth, manage to satisfy its nutritional needs? It is by studying social amoebae, elementary organisms that are distantly related to fungi and plants, that Audrey Dussutour, CNRS researcher at the Centre de Recherche sur la Cognition Animale and her Australian collaborators have, for the first time, demonstrated the nutritional preferences of such systems.

Despite lacking a centralizing organ, such amoebae are capable of regulating their nutrient supply. When faced with diverse nutritional situations, they adapt so as always to select an optimal ratio of nutrients.

The results are published in the journal *Proceedings of the National Academy of Sciences* on 9 February 2010.

In most animals, nutrition involves components specialized in the regulation of nutritional supply and demand (in most animals, for example, the brain controls the needs of the body cells). However, certain organisms, such as fungi, have neither a specialized component nor a coordination center. How then do they maintain an optimal supply of the nutrients essential for their survival and reproduction?

Audrey Dussutour and her University of Sydney collaborators have taken a keen interest in one of the simplest life forms on Earth: single-celled organisms. Both numerous and varied, they make up a large part of living organisms, including bacteria, yeasts, fungi, certain algae and some animals (or protozoa). The researchers focused their study on a certain type of amoeba, the most well-known of protozoa: the "social amoeba" or *Physarum polycephalum*. This vast single cell, with thousands of nuclei, is found naturally in undergrowth environments.

In a first experiment, the researchers offered the amoebae 35 different food sources, each source containing a specific ratio and concentration of nutrients. The results were unequivocal: the amoebae develop in an optimal manner on a diet composed of twice as much protein as sugar, whereas they do not survive on a sugar-rich diet. Furthermore, the amoebae extend farther on diluted nutrient sources, which increases the contact surface area and thus compensates for low nutrient concentration.

The researchers then subjected the amoebae to various choices of nutrients, each time comprising a protein-rich and a sugar-rich source in varying proportions (without offering them their "optimal" diet). The results demonstrated that the amoebae are capable of reconstituting the ideal diet required for their growth from these two sources. In fact, they move until they cover the nutrient sources so as to absorb twice as much protein as sugar. Their nutrient intake thus remains constant and unchanging, whatever the choice proposed. In a final experiment, eleven different food sources, once again containing variable quantities of protein and sugar, were offered to the amoebae. Most of the amoebae succeeded in selecting the food source containing twice as much protein as sugar.

Social amoebae are thus capable of solving complex nutritional challenges, quite a surprising feat for a very simple organism lacking a centralizing system. The researchers are now attempting to elucidate the mechanisms involved.

Story Source:

Adapted from materials provided by CNRS (Délégation Paris Michel-Ange).

Journal Reference:

1. Audrey Dussutour, Tanya Latty, Madeleine Beekman, and Stephen J. Simpson. **Amoeboid organism solves complex nutritional challenges**. *Proceedings of the National Academy of Sciences*, 2010; DOI: 10.1073/pnas.0912198107

http://www.sciencedaily.com/releases/2010/02/100210164712.htm

Pharmacy Students Practice Diagnostic Skills on Robotic Patient

3rd Year Pharmacy student Joe Tooley, examines SimMan for breathing difficulties. (Credit: Nic Delves-Broughton)

ScienceDaily (Feb. 15, 2010) — A robot that can be programmed to have a range of medical conditions, from heart disease to constipation, is being used by Pharmacy students at the University of Bath to help practise diagnostic skills and treating patients.

The SimMan 3G, dubbed "Simon" by the students, is a life-sized model that talks, breathes and reacts to medicines in the same way as a real human. He can be examined for blood pressure, heart and lung function, and can even be changed into a female!

Dr Denise Taylor, Senior Teaching Fellow in Clinical Pharmacy said: "He's amazingly life-like. He has a pulse, his pupils constrict when you shine a light in them and he also reacts to drugs in a similar way to a real person. If he has a reaction to a medicine, he might have a seizure, sweat or vomit.

"He's an amazing resource because he gives students a chance to practise examination skills, including diagnosis and treatment of patients, in a safe environment."

Whilst SimMan 3G is widely used for training doctors in medical school, the University of Bath is one of the first pharmacy departments to own one.

It is part of a new state-of-the-art teaching suite opened recently by Vice-Chancellor Professor Glynis Breakwell.

The suite is set up like a real pharmacy, with a dispensary and patient consulting rooms. Each student is assigned a set of fictitious patients, each with medication records that the student can use to decide which medicines may be prescribed and dispensed safely.

The new laboratory also includes six pharmacy consultation rooms, where students are filmed whilst role-playing encounters with patients, played by teaching staff or professional actors. This gives students valuable feedback as to how well they communicate with patients.

Head of Pharmacy Practice Professor Marjorie Weiss said: "The role of the pharmacist is changing significantly.

"They are increasingly offering more patient-facing services such as giving advice to patients about appropriate medicine use, minor illnesses and healthy lifestyles. Some pharmacists, with additional training, can also prescribe medicines.

"This calls on the pharmacist's clinical and communication skills -- they might have to explain a medicine-taking routine to a patient, offer advice on quitting smoking, check an individual's cholesterol level or identify underlying issues, such as depression."

Pro-Vice-Chancellor for Research, Professor Jane Millar, added: "Pharmacy practice has made great advances over recent years, and so this new pharmacy practice suite will ensure that University of Bath pharmacists have the best possible vocational education to equip them to meet the needs of their profession."

The laboratory was set up with funding from the Wolfson Foundation and the University's Alumni Fund.

Story Source:

Adapted from materials provided by University of Bath.

http://www.sciencedaily.com/releases/2010/02/100215130336.htm

Why We Gain Weight As We Age

by Patti Neighmond

Al Bello/Getty Images

As we age, our muscles deteriorate, and they don't repair as quickly as they used to. But the good news is that exercise and weightlifting can still make muscles stronger.

February 22, 2010

It's a pretty common lament, the idea that you just can't eat what you used to. But why is that so? And is it avoidable? There are a number of reasons why we put on the pounds as years go by, but take heart: There are ways to fight back — and win!

There are some particular biological changes that happen as we age. For one, aging muscles actually contribute to the increase in the amount of fat we store in our bodies, says Cheryl Phillips, president of the American Geriatrics Society.

"So, if you look at a woman who is 70 years old and compare her to what her body was like at 25 years of age, even though her weight may be exactly the same, she had more percentage of muscle in her body when she was 25 than she does when she's 70."

Our Aging Muscles

In large part, that's because we lose muscle cells as we age. When younger muscle cells get damaged, they're quickly repaired. That's not the case with older muscles, according to UCLA researcher and geriatrician Jonathan Wanagat. He says we don't know why muscles literally shrink as we age. But there are a number of theories.

"I think one of the ones that have become increasingly interesting and popular is the idea that the stem cells in the muscle are not able to respond to damage or to aging the way they did when we were

younger," says Wanagat. And if damaged muscle cells aren't repaired, they sort of whittle away and die, he says. Decreases in growth hormone, testosterone and estrogen levels may also account for the loss of muscle fiber and the inability of tissue to replenish itself.

In addition, the muscle cells we're left with are sort of worn out, according to Phillips. "If you think of muscles as being the energy powerhouse of our body, that's where most of our calories are burned. And when we talk about metabolism, what we're really talking about is how efficiently those powerhouse cells — the muscle cells of our body — burn the energy we bring in."

Energy is delivered to the body in the form of calories. And if you keep your caloric intake exactly the same as you get older, says Phillips, those unburned calories end up as fat.

Researchers test older adults in different yoga positions to determine how each pose stresses muscles and joints — to maximize strength-building and minimize risk of injury. The markers on the subject help the researchers create a musculoskeletal model of the poses.

Musculoskeletal Biomechanics Research Laboratory at USC
Researchers test older adults in different yoga positions to determine how each pose stresses muscles and joints — to maximize strength-building and minimize risk of injury. The markers on the subject help the researchers create a musculoskeletal model of the poses.

Its sort of a one-two punch, says Wanagat. The energy powerhouse cells in muscles get damaged with age. That damage accumulates over time and, on top of that, the body's ability to repair that damage also dwindles with aging.

Building Strength At Any Age

And that's where exercise comes in. Wanagat says countless studies have shown that exercise — even among individuals in their 80s — works. It actually helps the muscle cells get bigger. And beyond size, it makes the muscles stronger.

"We aren't sure exactly how exercise makes muscles stronger, but we know that when we measure the grip strength of the hands or feet, grip is strongest just after exercise, even among people in their 80s and 90s. So weightlifting at any age offers low risk and great benefit, says Wanagat.

At UCLA, geriatrician and researcher Gail Greendale has just begun a second yoga study with seniors to try to figure out what poses work best for the older body. Greendale wants to understand how each yoga pose stresses muscles and joints. Then, she hopes to figure out how to modify the poses for the older body in order to maximize strength-building and minimize injury.

In addition, Greendale says that as we age the immune system can get out of whack, turning on an inflammatory response when there are no bacteria or viruses to kill, and keeping it on long after the body's invaders have left. Such an inappropriate inflammatory response can actually damage one's own cells in whatever part of the body the inflammation occurs, whether it's in muscles, joints or organs.

Ensuring such muscle and joint strength can also help fight this and other unfortunate aspects of aging, arthritis and inflammation. People over 75 are likely to have chronic joint problems, says Greendale. The joints are less able to tolerate the strain and stress of movement; they can be painful and swollen. Building joint and muscle strength can defend against that.

http://www.npr.org/templates/story/story.php?storyId=123887823&sc=nl&cc=hh-20100222

Rational Or Emotional? Your Brain On Food

by Allison Aubrey

February 22, 2010

Scientists are working to understand what hormonal and physiological cues in the body lead the brain to respond to food emotionally.

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February 22, 2010

Willpower plays a role in dieting. But keeping the weight off after you've lost it? This is where our physiology can get in the way. Research suggests that hormone shifts that follow weight loss play a role in changing the way our brain responds to food.

"After you've lost weight, you have an increase in the emotional response to food," says Columbia University Medical Center researcher Michael Rosenbaum, who studies the body's response to weight loss. He says you also see "a decrease in the activity of brain systems that might be more involved in restraint."

And there's another factor making weight loss maintenance tough, too: a slower metabolism. When you lose weight, the body adapts to conserve energy, so it just doesn't need as many calories.

One of the hormones that play a role in controlling appetite in the body is called leptin. After significant weight loss, leptin levels drop. This seems to signal to the brain a need to seek more food.

Rosenbaum and his colleague Joy Hirsch, a neuroscientist at Columbia University Medical Center, designed an experiment to better understand the relationship between the brain, leptin and weight-loss maintenance.

They recruited overweight volunteers who agreed to a calorie-restricted diet aimed at shedding 10 percent of body weight. Using fMRI scans, the researchers looked at how the volunteers' brain responses to seeing food changed after weight loss.

Still Emotionally Attached

During their study, Hirsch and her colleagues found some interesting patterns of neural activity in their volunteers after they'd lost weight.

For instance, there was more blood flow to areas of the brain known to be involved in the emotional control of food intake, such as the brainstem and parahippocampal gyrus.

But here's the fascinating part: When they restored leptin to these volunteers by giving them injections of the hormone, the brain response changed. When they saw food, there was more activity in brain areas associated with conscious decisions.

"It's a feedback mechanism," says Rexford Ahima of the University of Pennsylvania. Leptin signals the brain; when there's a deficiency of the hormone, the areas of the brain associated with reward-seeking become more active.

This evolutionary programming is out of sync with what's healthiest for our bodies. The signal evolved over thousands of years when food was scarce. It was the brain's way of telling the body to seek food and protect fat stores. Many people — particularly those who are prone to gain weight easily — have retained more genes that program us to seek food.

As for the role of leptin, researchers say it's clear that leptin is not an anti-obesity hormone — it won't help you lose weight.

But Ahima says the most recent research suggests that leptin — or drugs that would stimulate leptin signaling — could potentially facilitate the maintenance of weight loss. So far, this has only been tested in experimental trials.

My Brain's Response To 'The Food Parade'

Researchers tested subjects, including NPR's Allison Aubrey, by showing them a mirror image of the real foods displayed above. They compared their brain response to food with the brain activity when it viewed mundane household objects.

The researchers invited me to their lab at the Neurological Institute at Columbia to see exactly how the experiment works. Curious about how my brain would respond to food, I agreed to an fMRI scan.

As I lay in the scanner, I watched through a mirror as research assistants passed all kinds of foods — from carrot sticks and apples to Hershey's Kisses and cookies — through my line of sight.

"Think of it as a food parade," explained Hirsch. After 20 minutes of watching food, the researchers began analyzing my brain responses.

"You will see a very specific circuit in your brain that's associated with the appreciation of foods," explained Hirsch.

Hirsch says the patterns in my brain images were similar to those of test subjects with restored leptin. She pointed to areas in my parietal and frontal lobes that had activated as I watched the "food parade."

"This is the executive part of the brain," says Hirsch. "You're responding like somebody in a homeostatic [stable] state." This means that when I saw the images of food, my brain activated decision-making areas, and there wasn't nearly as much activity in the emotional, reward-seeking parts of the brain. Hirsch also pointed out that my brain showed lots of stimulation in areas related to visual processing.

Researchers spotted drastic difference in Aubrey's brain activity when she looked at foods, as compared to mundane objects like a cell phone. Areas of the brain associated with visual stimulation really lit up.

Of course my brain response could change. The brain images captured just a snapshot in time. But it was fascinating to see that I didn't have a very emotional response to food. By comparison, images they'd shown me of mundane household objects — such as a cell phone — didn't evoke nearly as much activity in the areas associated with executive function or visual processing.

Hirsch and Rosenbaum's findings were published in the *Journal of Clinical Investigation*. They're now working on follow-up studies to figure out if people's behavior maps with what they're seeing in brain scans.

"It's a work in progress," says Hirsch. But she thinks this research is showing that our physiology tends to set the brain in one of two modes:

The "regain" mode, which nudges us, emotionally, to seek food. Or the "retain" mode, which helps us maintain a steady weight. Researchers are following up with more studies to see if people's eating behaviors mirror their brain response to food.

http://www.npr.org/templates/story/story.php?storyId=123894109&sc=nl&cc=hh-20100222

Come On, Get Happy. It May Help Your Heart

By Nadja Popovich

Happy people may have even more to smile about. It turns out that being positive and enthusiastic could lower your risk of heart disease.

Something to smile about: people with sunnier dispositions were found to have a lower risk of heart disease. (ellie/Flickr)

A study, published yesterday in the *European Heart Journal*, looked at more than 1,700 people in Nova Scotia, Canada, and rated how upbeat they were.

According to Dr. Karina W. Davidson, associate professor of medicine at Columbia University and lead researcher, an initial assessment was used to predict participants' chances of getting a heart attack over the next decade. And it worked pretty well.

Ten years down the road, researchers found 145 of the people had had heart attacks. And it turned out that the more positive their outlook was at the beginning of the study, when the average age of the subjects was about 46 years old, the less likely they were to have had a heart attack.

Though other studies have looked at negative emotional effects on heart health, such as stress and anxiety, this is the first to look at the happy side of the coin.

Davidson told Shots that happiness--or positivity--scores were determined through careful clinical evaluations. Researchers videotaped interviews and later coded them for the degree of outwardly displayed positive attitude on a five-point scale. Later the subjects' health outcomes were compared with their initial evaluations. The scientists found that for every point increase in positivity on the scale, risk for cardiac incidents decreased by more than 20 percent.

The notion that happiness brings health benefits has been kicking around for a while. A 2005 study found that people who are more positive tend to resist cold and flu when exposed, and another study found that happiness decreases blood pressure--which might directly relate to the decreased risk of heart disease.

But let's face it, few people are happy all the time. So, barring the breakthrough invention of rose-colored glasses, what can we do?

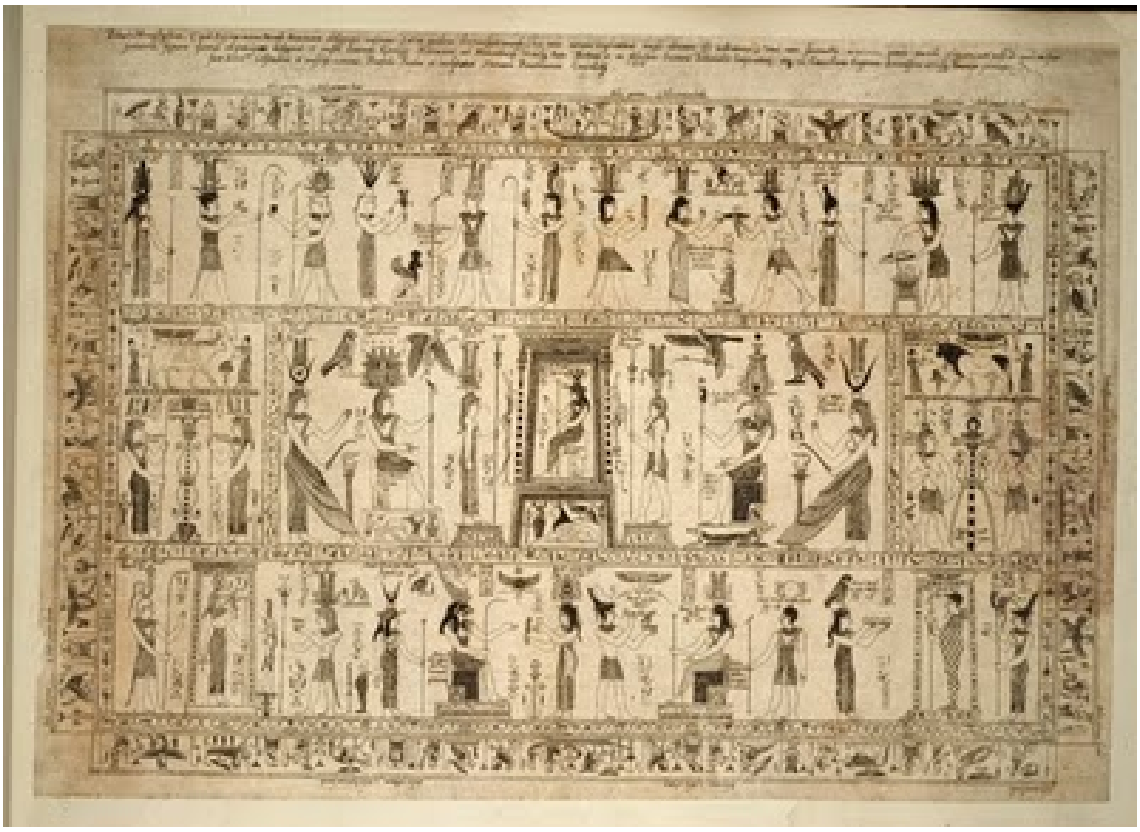
First a caveat, Davidson stressed that this study didn't test whether changes in positive attitudes also changed a person's heart risk. Her group only found that already positive people have a lessened risk of heart disease. Still, she was encouraged by the idea that we can improve our outlooks and get results.

"We already know that engaging in pleasurable or enjoyable activities most days of the week improves mental health. [So], we can already recommend that people ensure they have something they look forward to most days of the week," whether it's a drink with friends after work, or going to the gym, she said. Davidson added that a lot more work is needed to determine whether boosting your happiness will really boost your heart health.

But smiling a little more frequently certainly can't hurt. And we hear that a smile is contagious.

http://www.npr.org/blogs/health/2010/02/come_on_get_happy_it_may_prote.html?sc=nl&cc=hh-20100222

Who the Heck is Herwart von Hohenburg?



The Mensa Isiaca. Engraved plate number one from *Thesaurus Hieroglyphicorum*.

No copies have come to auction within the last thirty-five years. OCLC/KVK note only seven copies in institutional collections worldwide, only one of which is complete, in the Bibliothéque National - France. But another complete copy recently appeared out of nowhere and into the marketlace, unheralded, without fanfare.

The book is ***Thesaurus Hieroglyphicorum***, published in 1610 by Johann (aka Hans) Georg Herwart von Hohenburg (1554-1622). It is one of the earliest works on Egyptology.

It is a book that profoundly influenced Athanasius Kircher, one of the most fascinating individuals of the seventeenth - or any other - century.

Come with me now to those halcyon days of yesteryear, a few thousand yesteryears ago, when the land of the pharaohs would, a few thousand yesteryears later, in 1955, inspire one of film director Howard Hawks' few stinkers, Land of the Pharaohs, a rotten ibis notable only for Joan Collins fulfilling the wardrobe and promise she amply demonstrated in her screen debut, Lady Godiva Rides Again (1951), and as William Faulkner's last screenplay credit, aka *A Nobel Prize Don't Pay the Rent.*

Having time-caromed from 2010 all the way back to Khufu, then zipped forward to the Cold War's worst screen crime, we now whiplash backward again, to the seventeenth century where scholars are wondering what's up with ancient Egyptian writing, and what does it mean? What's with the guy with a falcon where his head is supposed to be?

These questions burned in Athanasius Kircher's mind. The most prominent scientist of his era, Kircher (1601-1680), a Jesuit priest, had to know all there was to know and made it his business to learn it. He was indeed, as Paula Findlen titled her biography of the polymath, The Last Man Who Knew Everything at a time when was possible for an individual to do so, before general science grew into the distinct branches with specialties within each that we know today and the exponential growth of knowledge precluded deposit into one brain without subsequent explosion.

"...In 1628, after [Athanasius Kircher's] ordination as a Jesuit priest in Speyer, Germany...he developed a keen interest in hieroglyphics, having seen a copy of Thesaurus hieroglyphicorum (1610) by the famed German scholar from Bavaria, Johann Georg Herwart von Hohenburg" (Alastair Hamilton. The Copts and the West, 1439-1822: The European Discovery of the Egyptian Church (New York: 2006, p. 203).

"Another influence on the young German was Johann Georg Herwart von Hohenburg's work Thesaurus Hieroglyphicorum (which contains an illustration of the Mensa Isiaca, thought to be a major source of Egyptian images, but now known to be a Roman or Alexandrian work of the early Imperial period in the Egyptianizing style). The result was Kircher's Prodromus Coptus sive Aegyptiacus (1636), the first Coptic grammar and the foundation for all subsequent Coptic studies: in it, he argued (correctly) that Coptic was related to the language of the Ancient Egyptians" (James Curl, review of Anthanasius Kircher's Theater of the World by Joscelyn Godwin, in Times Higher Education, 7 January 2010).

The first eleven plates in the Thesaurus Hieroglyphicorum are of the Mensa Isiaca aka the Bembine table of Isis. This remarkable table was produced sometime in the first century AD, probably in Rome at the height of the Egyptomania then consuming it. The hieroglyphs are nonsense and the cult scenes are Egyptianesque, but do not depict true Egyptian rites. Some of the scenes are so bizarre that it is unclear whether the figures are gods or kings and queens; it's a hieroglyphic hash. Egyptian motifs appear helter-skelter throughout. Nevertheless, the central figure in a chapel scene is clearly recognizable as the Egyptian mother goddess Isis, suggesting that the table originated somewhere the Isis cult was celebrated. It is a testament to Kircher's keen intellect that he was able to gain valuable insights from this Egypto-gobbldy-gook.

The Thesaurus Hieroglyphicorum was "one of the richest sources for Athanasius Kircher... Kircher drew heavily on the Mensa Isiaca for his sources" (Curl, James. The Egyptian Revival, pp. 59 and 112).

"These engravings were appropriated by Athanasius Kircher" (Oudheidkundige mededeelingen, Volumes 65-66, p. 24).

Stolzenberg discusses the Thesaurus Hieroglyphicorum in his Kircher study, *The Great Art of Knowing: The Baroque Encylopedia of Athanasius Kircher* (2001).

Johann Georg Herwart von Hohenburg (1553-1622) was a prominent Bavarian statesman and scholar of distinction. He was acknowledged for his accomplishments in astronomy, chronology, mathematics and philology. His work in chronology earned him the admiration of intellectuals such as Kepler's teacher, Michael Mästlin, who commended his "extraordinary industry," and his efforts in mathematics proved fundamental to the early formulation of logarithms by clockmaker Jöst Bürgi and John Napier. As a person of political prestige and intellectual prominence, Herwart stood at the center of a scholastic correspondence network that included the leading scientists of the day, amongst whom were Tycho Brahe, Johannes Praetorius, Helisaeus Röslin, and Johannes Kepler. In this last respect, he would provide a model for Kircher, who, a generation later, would fulfill the same role with 760 members of Europe's scientific and medical community, as well as the international Jesuit network; his hunger for knowledge of all kinds was insatiable.

For most of his professional life, Athansius Kircher was one of the scientific stars of the world. His early

life is highlighted by being shipwrecked and marooned. He dried off rapidly, made it back home, and soon was "the first scholar with a global reputation," writes Findlen. He combined his original experimentation and research with information learned from his correspondence - the Encyclopædia Britannica calls him a "one-man intellectual clearing house" - to publish thirty-five principal works that range from astronomy, optics, phonology, music, mathematics, natural history, geology, medicine, to Egyptology, and more; if it was interesting, he was on it. His books, illustrated with commissioned engravings, were influential and sold well; he was the first scientist to earn a living from his books. He, along with his acolyte, assistant, and fellow Jesuit, Gaspar Schott, popularized science.

Kircher's scientific career occurred during an important transition period in science, when reason, rigor, measurement, and experimentation began to overthrow superstition, harebrained hypothesis, wacko explanation, and unprovable theory. Kircher stood with a foot in each world, making recognized advances in optics while at the same time, for instance, clinging to a belief in the powers oif certain stones.

Much of Kircher's work would be forgotten in the generations that followed Isaac Newton, of the immediate generation succeeding Kircher, his contributions built upon or confirmed (or rejected) by others using a refined and wholly rational scientific method. He was wrong about so much yet right about enough that he was rediscovered by science historians in the later twentieth century and given his just due.

Herwart von Hohenburg who? He influenced Kircher and more than a few.

HERWART von HOHENBURG, Johannes Georgius. *Thesaurus Hieroglyphicorum* è Museo Joannis Georgii Herwart ab Hohenburg, utriusque juris doctoris, & ex assessore summi Tribunalia Imperatorii, atque ex Calncellario supremo serenissimi utriusque Bavariae Principis... Munich (Ausberg?): n.p., 1610.

First (only) edition, complete. Oblong folio (13 3/4 x 20 7/8 in; 350 x 530 mm). Printed title page with four small mounted engravings, and twenty-six large engravings (one folding) mounted on twenty-five leaves. Engravings cut to plate lines.

Eighteenth century quarter calf over boards. Manuscript notes in ink (17th century) and pencil (19th -20th century?) to front free endpaper.

Graesse III, p. 262. Bibliotheca Augustana p. 150

http://www.bookpatrol.net/2010/02/who-heck-is-herwart-von-hohenburg.html?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+BookPatrol+%28Book+Patrol%29

Drugs 'could stop spread of Aids'

Anti-retroviral treatments (ARVs) and universal testing could stop the spread of Aids in South Africa within five years, a top scientist says.

Dr Brian Williams says the cost of giving the drugs to almost six million HIV-positive patients in the country would be $2-3bn per year.

Only about 30% get the life-saving drugs, he said, but early detection and treatment would prevent transmission.

This, he said, should be complementary to the search for an Aids vaccine.

An effective vaccine, he said, was still a long way away.

Dr Williams, a leading figure in the field of HIV research, is based at the South African Centre for Epidemiological Modelling and Analysis (Sacema) in Stellenbosch.

Success story

Speaking at at the annual meeting of the American Association for the Advancement of Science (AAAS) in San Diego, he said 30 million people around the world were infected with HIV - with two million dying each year.

" **We could break the back of the epidemic** "
Dr Brian Williams, Sacema

"The tragedy is that the disease continues unabated. The only real success story is the development of these extremely effective drugs that keep people alive and reduce their viral load by up to 2,000 times. They become close to non-infectious.

"While the rapid scale-up in the provision of ART in the last five years has exceeded expectations, it has not reduced HIV-transmission and Aids-related TB because it has been given too late in the course of infection."

Dr Williams argued that by the time people started ART, they had infected "most of those that they would have infected anyway".

"We've been using drugs to save lives, but not stop the infection," he said.

"It's time to look beyond that."

He said that if clinical trials started now, all of the HIV positive people in South Africa could be on ARV treatment within five years.

Dr Williams said a few clinical trials were already beginning in the US, Canada and sub-Saharan Africa - and he hoped to have the answer "in one or two years".

Kenneth Mayer, professor of medicine at Brown University in the US state of Rhode Island, agreed that treating patients early with ARVs was a matter of "public health".

The US National Institute of Allergy and Infectious Diseases is planning a trial in New York and Washington - in districts that have an HIV positive population at a similar level to African epidemics.

"We need to get answers [from these trials] quickly. That will help us move forward," Dr Williams said.

"We could break the back of the epidemic. If we can do it, I'm confident it will work."

But Lisa Power, head of policy at the UK HIV charity the Terrence Higgins Trust, said: "We need to be clear; these proposals would very much slow the spread of HIV in areas with generalised epidemics such as sub-Saharan Africa, but they will not stop it by themselves.

"Alongside testing and treatment, education on safer sex and access to condoms remain crucial if we are to contain the epidemic."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8526690.stm

Published: 2010/02/21 08:14:59 GMT

Sex hormone trial for head injury
By Victoria Gill
Science reporter, BBC News, San Diego

Natural progesterone, the sex hormone used in the first contraceptive pills, is to be tested on patients with severe head injuries.

Scientists will begin a phase III clinical trial in March and say the drug could save patients' lives and reduce damage to their brains.

They announced the trial at the annual meeting of the American Association for the Advancement of Science.

It will involve 1,000 patients in 17 trauma centres across the US.

Dr David Wright, associate professor of emergency medicine at Emory University in Atlanta, will lead the trial.

Complex condition

Previous studies have shown that progesterone supports the normal development of neurons in the brain, and that the hormone has a protective effect on damaged brain tissue.

Dr Wright told BBC News: "Traumatic brain injury is a complex condition - there's swelling, and neuronal death and damage occurring all at the same time.

"The beauty of progesterone is that it seems to work on all of those things."

In earlier tests, the Emory University researchers found that progesterone reduced the risk of death in patients with brain injuries.

Dr Wright hopes that, following this trial, progesterone will become the first drug treatment in 30 years to be approved specifically for severe traumatic brain injury.

Yams

The active ingredient, natural progesterone, is very similar to that used in the first contraceptive pills. This has now been superseded by a synthetic progesterone known as progestin. But, for brain injury, only the natural hormone appears to have the desired protective effect.

During the trial, patients with blunt trauma head injuries will be given an infusion of natural progesterone that will last for four days. The hormone is extracted from wild yams.

"The dose is probably about three times what would be found in [the blood] of a female in the third trimester of pregnancy," Dr Wright explained.

The US Food and Drug Administration (FDA) has made a special allowance for the team to administer the drug without patients' consent - so it can be given as soon as possible and have the maximum protective effect.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8525777.stm

Published: 2010/02/20 07:44:33 GMT

Singing 'rewires' damaged brain

By Victoria Gill
Science reporter, BBC News, San Diego

Teaching stroke patients to sing "rewires" their brains, helping them recover their speech, say scientists.

By singing, patients use a different area of the brain from the area involved in speech.

If a person's "speech centre" is damaged by a stroke, they can learn to use their "singing centre" instead.

Researchers presented these findings at the annual meeting of the American Association for the Advancement of Science (AAAS) in San Diego.

An ongoing clinical trial, they said, has shown how the brain responds to this "melodic intonation therapy".

Gottfried Schlaug, a neurology professor at Beth Israel Deaconess Medical Center and Harvard Medical School in Boston, US, led the trial.

The therapy is already established as a medical technique. Researchers first used it when it was discovered that stroke patients with brain damage that left them unable to speak were still able to sing.

Professor Schlaug explained that his was the first study to combine this therapy with brain imaging - "to show what is actually going on in the brain" as patients learn to sing their words.

Making connections

Most of the connections between brain areas that control movement and those that control hearing are on the left side of the brain.

"But there's a sort of corresponding hole on the right side," said Professor Schlaug.

" **Music engages huge swathes of the brain - it's not just lighting up a spot in the auditory cortex** "
Dr Aniruddh Patel, neuroscientist

"For some reason, it's not as endowed with these connections, so the left side is used much more in speech.

"If you damage the left side, the right side has trouble [fulfilling that role]."

But as patients learn to put their words to melodies, the crucial connections form on the right side of their brains.

Previous brain imaging studies have shown that this "singing centre" is overdeveloped in the brains of professional singers.

During the therapy sessions, patients are taught to put their words to simple melodies.

Professor Schlaug said that after a single session, a stroke patients who was are not able to form any intelligible words learned to say the phrase "I am thirsty" by combining each syllable with the note of a melody.

The patients are also encouraged to tap out each syllable with their hands. Professor Schlaug said that this seemed to act as an "internal pace-maker" which made the therapy even more effective.

"Music might be an alternative medium to engage parts of the brain that are otherwise not engaged," he said.

Brain sounds

Dr Aniruddh Patel from the Neurosciences Institute in San Diego, said the study was an example of the "explosion in research into music and the brain" over the last decade.

"People sometimes ask where in the brain music is processed and the answer is everywhere above the neck," said Dr Patel.

"Music engages huge swathes of the brain - it's not just lighting up a spot in the auditory cortex."

Dr Nina Kraus, a neuroscientist from Northwestern University in Chicago, also studies the effects of music on the brain.

In her research, she records the brain's response to music using electrodes on the scalp.

This work has enabled her to "play back" electrical activity from brain cells as they pick up sounds.

"Neurons work with electricity - so if you record the electricity from the brain you can play that back through speakers and hear how the brain deals with sounds," she explained.

Dr Kraus has also discovered that musical training seems to enhance the ability to perform other tasks, such as reading.

She said that the insights into how the brain responds to music provided evidence that musical training was an important part of children's education.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8526699.stm

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Dolphins have diabetes off switch

By Victoria Gill
Science reporter, BBC News, San Diego

A study in dolphins has revealed genetic clues that could help medical researchers to treat type 2 diabetes.

Scientists from the US National Marine Mammal Foundation said that bottlenose dolphins are resistant to insulin - just like people with diabetes.

But in dolphins, they say, this resistance is switched on and off.

The researchers presented the findings at the annual meeting of the American Association for the Advancement of Science (AAAS) in San Diego.

They hope to collaborate with diabetes researchers to see if they can find and possibly even control an equivalent human "off switch".

The team, based in San Diego, took blood samples from trained dolphins that "snack" continuously during the day and fast overnight.

"The overnight changes in their blood chemistry match the changes in diabetic humans," explained Stephanie Venn-Watson, director of veterinary medicine at the foundation.

This means that insulin - the hormone that reduces the level of glucose in the blood - has no effect on the dolphins when they fast.

Big brains

In the morning, when they have their breakfast, they simply switch back into a non-fasting state, said Dr Venn-Watson. In diabetic people, chronic insulin resistance means having to carefully control blood glucose, usually with a diet low in sugar, to avoid a variety of medical complications.

But in dolphins, the resistance appears to be advantageous. Dr Venn-Watson explained that the mammals may have evolved this fasting-feeding switch to cope with a high-protein, low-carbohydrate diet of fish.

"Bottlenose dolphins have large brains that need sugar," Dr Venn-Watson explained. Since their diet is very low in sugar, "it works to their advantage to have a condition that keeps blood sugar in the body… to keep the brain well fed".

But other marine mammals, such as seals, do not have this switch, and Dr Venn-Watson thinks that the "big brain factor" could be what connects human and dolphin blood chemistry.

“ **There are several interesting diseases that you only see in humans and dolphins** ”
Lori Schwacke NOAA

"We're really looking at two species that have big brains with high demands for blood glucose," she said.

"And we have found changes in dolphins that suggest that [this insulin resistance] could get pushed into a disease state. "If we started feeding dolphins Twinkies, they would have diabetes."

Genetic link

Since both the human genome and the dolphin genome have been sequenced, Dr Venn-Watson hopes to work with medical researchers to turn the discovery in dolphins into an eventual treatment for humans.

"There is no desire to make a dolphin a lab animal," she said. "But the genome has been mapped - so we can compare those genes with human genes."

Scientists at the Salk Institute in San Diego have already discovered a "fasting gene" that is abnormally turned on in people with diabetes, "so maybe this is a smoking gun for a key point to control human diabetes", Dr Venn-Watson said.

If scientists can find out what switches the fasting gene on and off in dolphins, they may be able to do the same thing in people.

Lori Schwacke, a scientist from the National Oceanic and Atmospheric Administration (NOAA) in Charleston, South Carolina, said that the work demonstrated that there are interesting similarities between dolphins and humans.

Dr Schwacke, who is studying the effect of pollution on dolphins along the coast of the US state of Georgia, is also interested in the links between dolphin and human health.

"There are several interesting diseases that you only see in humans and dolphins," she told BBC News. In this case, Dr Venn-Watson said, "the fundamental difference is that dolphins can switch it off and humans can't".

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8523412.stm

Published: 2010/02/19 09:18:39 GMT

Nap 'boosts' brain learning power

A nap during the day improves the brain's ability to absorb new information, US scientists claim.

Volunteers who slept for 90 minutes during the day did better at cognitive tests than those who were kept awake.

Results of the University of California at Berkeley study involving 39 healthy adults were presented at a conference.

A UK-based sleep expert said it was hard to separate the pure "memory boosting" effects of sleep from those of simply being less tired.

" **Sleep not only rights the wrong of prolonged wakefulness, but, at a neurocognitive level, it moves you beyond where you were before you took a nap** "
Dr Matthew Walker, UC Berkeley

The wealth of study into the science of sleep in recent years has so far failed to come up with conclusive evidence as to the value of a quick "siesta" during the day.

The latest study suggests that the brain may need sleep to process short-term memories, creating "space" for new facts to be learned.

In their experiment, 39 healthy adults were given a hard learning task in the morning - with broadly similar results, before half of them were sent for their siesta.

When the tests were repeated, the nappers outperformed those who had carried on without sleep.

Checks on brain electrical activity suggested that this process might be happening in a sleep phase between deep sleep, and dreaming sleep, called stage 2 non-rapid eye movement sleep, when fact-based

memories are moved from "temporary storage" in the brain's hippocampus to another area called the pre-frontal cortex.

Brain 'inbox'

Dr Matthew Walker, who led the study, reported at the AAAS conference in San Diego, said: "Sleep not only rights the wrong of prolonged wakefulness, but, at a neurocognitive level, it moves you beyond where you were before you took a nap.

"It's as though the e-mail inbox in your hippocampus is full, and, until you sleep and clear out all those fact e-mails, you're not going to receive any more mail.

"It's just going to bounce until you sleep and move it into another folder."

However, Professor Derk-Jan Dijk, the director of the Surrey Sleep Research Centre, said that there was no clear evidence that daytime napping offered a distinct advantage over sleeping just once over 24 hours.

"The sleep-wake cycle is not as rigid as we might think - we have the capability to sleep in different ways."

He said that while the brain effect reported in the study might be spotted in a laboratory setting, the picture became more clouded in the "real world".

"The size of these effects are much more difficult to assess - if I have to learn something, for example, it's easier to do this when I'm feeling awake and alert than when I'm sleepy."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8524549.stm

Published: 2010/02/21 10:28:00 GMT

Triumph of the Cyborg Composer

By: Ryan Blitstein | February 22, 2010 | 05:00 AM (PDT) |

David Cope's software creates beautiful, original music. Why are people so angry about that?

The office looks like the aftermath of a surrealistic earthquake, as if David Cope's brain has spewed out decades of memories all over the carpet, the door, the walls, even the ceiling. Books and papers, music scores and magazines are all strewn about in ragged piles. A semi-functional Apple Power Mac 7500 (discontinued April 1, 1996) sits in the corner, its lemon-lime monitor buzzing. Drawings filled with concepts for a never-constructed musical-radio-space telescope dominate half of one wall. Russian dolls and an exercise bike, not to mention random pieces from homemade board games, peek out from the intellectual rubble. Above, something like 200 sets of wind chimes from around the world hang, ringing oddly congruent melodies.

And in the center, the old University of California, Santa Cruz, emeritus professor reclines in his desk chair, black socks pulled up over his pants cuffs, a thin mustache and thick beard lending him the look of an Amish grandfather.

It was here, half a dozen years ago, that Cope put Emmy to sleep. She was just a software program, a jumble of code he'd originally dubbed Experiments in Musical Intelligence (EMI, hence "Emmy"). Still — though Cope struggles not to anthropomorphize her — he speaks of Emmy wistfully, as if she were a deceased child.

Emmy was once the world's most advanced artificially intelligent composer, and because he'd managed to breathe a sort of life into her, he became a modern-day musical Dr. Frankenstein. She produced thousands of scores in the style of classical heavyweights, scores so impressive that classical music scholars failed to identify them as computer-created. Cope attracted praise from musicians and computer scientists, but his creation raised troubling questions: If a machine could write a Mozart sonata every bit

as good as the originals, then what was so special about Mozart? And was there really any soul behind the great works, or were Beethoven and his ilk just clever mathematical manipulators of notes?

Cope's answers — not much, and yes — made some people very angry. He was so often criticized for these views that colleagues nicknamed him "The Tin Man," after the *Wizard of Oz* character without a heart. For a time, such condemnation fueled his creativity, but eventually, after years of hemming and hawing, Cope dragged Emmy into the trash folder.

This month, he is scheduled to unveil the results of a successor effort that's already generating the controversy and high expectations that Emmy once drew. Dubbed "Emily Howell," the daughter program aims to do what many said Emmy couldn't: create original, modern music. Its compositions are innovative, unique and — according to some in the small community of listeners who've heard them performed live — superb.

With Emily Howell, Cope is, once again, challenging the assumptions of artists and philosophers, exposing revered composers as unknowing plagiarists and opening the door to a world of creative machines good enough to compete with human artists. But even Cope still wonders whether his decades of innovative, thought-provoking research have brought him any closer to his ultimate goal: composing an immortal, life-changing piece of music.

Cope's earliest memory is looking up at the underside of a grand piano as his mother played. He began lessons at the age of 2, eventually picking up the cello and a range of other instruments, even building a few himself. The Cope family often played "the game" — his mother would put on a classical record, and the children would try to divine the period, the style, the composer and the name of works they'd read about but hadn't heard. The music of masters like Rachmaninov and Stravinsky instilled in him a sense of awe and wonder.

Nothing, though, affected Cope like Tchaikovsky's *Romeo and Juliet*, which he first heard around age 12. Its unconventional chord changes and awesome Sturm und Drang sound gave him goose bumps. From then on, he had only one goal: writing a piece that some day, somewhere, would move some child the same way Tchaikovsky moved him. "That, just simply, was the orgasm of my life," Cope says.

He begged his parents to pay for the score, brought it home and translated it to piano; he studied intensely and bought theory books, divining, scientifically, what made it work. It was then he knew he had to become a composer.

Cope sailed through music schooling at Arizona State University and the University of Southern California, and by the mid-1970s, he had settled into a tenured position at Miami University of Ohio's prestigious music department. His compositions were performed in Carnegie Hall and The Kennedy Center for the Performing Arts, and internationally from Lima, Peru, to Bialystok, Poland. He built a notable electronic music studio and toured the country, wowing academics with demonstrations of the then-new synthesizer. He was among the foremost academic authorities on the experimental compositions of the 1960s, a period during which a fired-up jet engine and sounds derived from placing electrodes on plants were considered music.

When Cope moved to UC Santa Cruz in 1977 to take a position in its music department, he could've put his career on autopilot and been remembered as a composer and author. Instead, a brutal case of composer's block sent him on a different path.

In 1980, Cope was commissioned to write an opera. At the time, he and his wife, Mary (also a Santa Cruz music faculty member), were supporting four children, and they'd quickly spent the commission money on household essentials like food and clothes. But no matter what he tried, the right notes just wouldn't

come. He felt he'd lost all ability to make aesthetic judgments. Terrified and desperate, Cope turned to computers.

Along with his work on synthesis, or using machines to create sounds, Cope had dabbled in the use of software to compose music. Inspired by the field of artificial intelligence, he thought there might be a way to create a virtual David Cope software to create new pieces in his style.

The effort fit into a long tradition of what would come to be called algorithmic composition. Algorithmic composers use a list of instructions — as opposed to sheer inspiration — to create their works. During the 18th century, Joseph Haydn and others created scores for a musical dice game called *Musikalisches Würfelspiel*, in which players rolled dice to determine which of 272 measures of music would be played in a certain order. More recently, 1950s-era University of Illinois researchers Lejaren Hiller and Leonard Isaacson programmed stylistic parameters into the Illiac computer to create the *Illiac Suite*, and Greek composer Iannis Xenakis used probability equations. Much of modern popular music is a sort of algorithm, with improvisation (think guitar solos) over the constraints of simple, prescribed chord structures.

Few of Cope's major works, save a dalliance with Navajo-style compositions, had strayed far from classical music, so he wasn't a likely candidate to rely on software to write. But he did have an engineer's mind, composing using note-card outlines and a level of planning that's rare among free-spirited musicians. He even claims to have created his first algorithmic composition in 1955, instigated by the singing of wind over guide wires on a radio tower.

Cope emptied Santa Cruz's libraries of books on artificial intelligence, sat in on classes and slowly learned to program. He built simple rules-based software to replicate his own taste, but it didn't take long before he realized the task was too difficult. He turned to a more realistic challenge: writing chorales (four-part vocal hymns) in the style of Johann Sebastian Bach, a childhood favorite. After a year's work, his program could compose chorales at the level of a C-student college sophomore. It was correctly following the rules, smoothly connecting chords, but it lacked vibrancy. As AI software, it was a minor triumph. As a method of producing creative music, it was awful.

Cope wrestled with the problem for months, almost giving up several times. And then one day, on the way to the drug store, Cope remembered that Bach wasn't a machine — once in a while, he broke his rules for the sake of aesthetics. The program didn't break any rules; Cope hadn't asked it to.

The best way to replicate Bach's process was for the software to derive his rules — both the standard techniques and the behavior of breaking them. Cope spent months converting 300 Bach chorales into a database, note by note. Then he wrote a program that segmented the bits into digital objects and reassembled them the way Bach tended to put them together.

The results were a great improvement. Yet as Cope tested the recombinating software on Bach, he noticed that the music would often wander and lacked an overall logic. More important, the output seemed to be missing some ineffable essence.

Again, Cope hit the books, hoping to discover research into what that something was. For hundreds of years, musicologists had analyzed the rules of composition at a superficial level. Yet few had explored the details of musical style; their descriptions of terms like "dynamic," for example, were so vague as to be unprogrammable. So Cope developed his own types of musical phenomena to capture each composer's tendencies — for instance, how often a series of notes shows up, or how a series may signal a change in key. He also classified chords, phrases and entire sections of a piece based on his own grammar of musical storytelling and tension and release: statement, preparation, extension, antecedent, consequent. The system is analogous to examining the way a piece of writing functions. For example, a word may be a noun in preparation for a verb, within a sentence meant to be a declarative statement, within a paragraph that's a consequent near the conclusion of a piece.

Finally, Cope's program could divine what made Bach sound like Bach and create music in that style. It broke rules just as Bach had broken them, and made the result sound musical. It was as if the software had somehow captured Bach's spirit — and it performed just as well in producing new Mozart compositions and Shakespeare sonnets. One afternoon, a few years after he'd begun work on Emmy, Cope clicked a button and went out for a sandwich, and she spit out 5,000 beautiful, artificial Bach chorales, work that would've taken him several lifetimes to produce by hand.

When Emmy's Bach pieces were first performed, at the University of Illinois at Urbana-Champaign in 1987, they were met with stunned silence. Two years later, a series of performances at the Santa Cruz Baroque Festival was panned by a music critic — two weeks before the performance. When Cope played "the game" in front of an audience, asking which pieces were real Bach and which were Emmy-written Bach, most people couldn't tell the difference. Many were angry; few understood the point of the exercise.

Cope tried to get Emmy a recording contract, but classical record companies said, "We don't do contemporary music," and contemporary record companies said the opposite. When he finally did land a deal, no musician would play the music. He had to record it with a Disklavier (a modern player piano), a process so taxing he nearly suffered a nervous breakdown.

Though musicians and composers were often skeptical, Cope soon attracted worldwide notice, especially from scientists interested in artificial intelligence and the small, promising field called artificial creativity. Other "AC" researchers have written programs that paint pictures; that tell Mexican folk tales or write detective novels; and that come up with funny jokes. They have varying goals, though most seek to better understand human creativity by modeling it in a machine.

To many in the AC community, including the University of Sussex's Margaret Boden, doyenne of the field, Emmy was an incredible accomplishment. There's a test, named for World War II-era British computer scientist Alan Turing, that's a simple check for so-called artificial intelligence: whether or not a person interacting with a machine and a human can tell the difference. Given its success in "the game," it could be argued that Emmy passed the Turing Test.

Cope had taken an unconventional approach. Many artificial creativity programs use a more sophisticated version of the method Cope first tried with Bach. It's called intelligent misuse — they program sets of rules, and then let the computer introduce randomness. Cope, however, had stumbled upon a different way of understanding creativity.

In his view, all music — and, really, any creative pursuit — is largely based on previously created works. Call it standing on the shoulders of giants; call it plagiarism. Everything we create is just a product of recombination.

In Cope's fascinating hovel of a home office on a Wednesday afternoon, I ask him how exactly he knows that's true. Just because he built a program that can write music using his model, how can he be so certain that that's the way man creates?

Cope offers a simple thought experiment: Put aside the idea that humans are spiritually and creatively endowed, because we'll probably never fully be able to understand that. Just look at the zillions of pieces of music out there.

"Where are they going to come up with sounds that they themselves create without hearing them first?" he asks. "If they're hearing them for the first time, what's the author of them? Is it birds, is it airplane sounds?"

Of course, some composers probably have taken dictation from birds. Yet the most likely explanation, Cope believes, is that music comes from other works composers have heard, which they slice and dice

subconsciously and piece together in novel ways. How else could a style like classical music last over three or four centuries?

To prove his point, Cope has even reverse-engineered works by famous composers, tracing the tropes, phrases and ideas back to compositions by their forebears.

"Nobody's original," Cope says. "We are what we eat, and in music, we are what we hear. What we do is look through history and listen to music. Everybody copies from everybody. The skill is in how large a fragment you choose to copy and how elegantly you can put them together."

Cope's claims, taken to their logical conclusions, disturb a lot of people. One of them is Douglas Hofstadter, a Pulitzer Prize-winning cognitive scientist at Indiana University and a reluctant champion of Cope's work. As Hofstadter has recounted in dozens of lectures around the globe during the past two decades, Emmy really scares him.

Like many arts aficionados, Hofstadter views music as a fundamental way for humans to communicate profound emotional information. Machines, no matter how sophisticated their mathematical abilities, should not be able to possess that spiritual power. As he wrote in *Virtual Music*, an anthology of debates about Cope's research, Hofstadter worries Emmy proves that "things that touch me at my deepest core — pieces of music most of all, which I have always taken as direct soul-to-soul messages — might be effectively produced by mechanisms thousands if not millions of times simpler than the intricate biological machinery that gives rise to a human soul."

I ask Cope whether Emmy bothers him. This is a man who averages about four daily hours of hardcore music listening, who's touched so deeply by a handful of notes on the piano as to shut his eyes in reverie.

"I can understand why it's an issue if you've got an extremely romanticized view of what art is," he says. "But Bach peed, and he shat, and he had a lot of kids. We're all just people."

As Cope sees it, Bach merely had an extraordinary ability to manipulate notes in a way that made people who heard his music have intense emotional reactions. He describes his sometimes flabbergasting conversations with Hofstadter: "I'd pull down a score and say, 'Look at this. What's on this page?' And he'd say, 'That's Beethoven, that's music of great spirit and great soul.' And I'd say, 'Wow, isn't that incredible! To me, it's a bunch of black dots and black lines on white paper! Where's the soul in there?'"

Cope thinks the old cliché of beauty in the eye of the beholder explains the situation well: "The dots and lines on paper are merely triggers that set things off in our mind, do all the wonderful things that give us excitement and love of the music, and we falsely believe that somewhere in that music is the thing we're feeling," he says. "I don't know what the hell 'soul' is. I don't know that we have any of it. I'm looking to get off on life. And music gets me off a lot of the time. I really, really, really am moved by it. I don't care who wrote it."

He does, of course, see Emmy as a success. He just thinks of her as a tool. Everything Emmy created, she created because of software he devised. If Cope had infinite time, he could have written 5,000 Bach-style chorales. The program just did it much faster.

"All the computer is is just an extension of me," Cope says. "They're nothing but wonderfully organized shovels. I wouldn't give credit to the shovel for digging the hole. Would you?"

Cope has a complex relationship with his critics, and with people like Hofstadter who are simultaneously awed and disturbed by his work. He denounces some as focused on the wrong issues. He describes others as racists, prejudiced against all music created by a computer. Yet he thrives on the controversy. If not for the harsh reaction to the early Bach chorales, Cope says, he probably would have abandoned the project. Instead, he decided to "ram Emmy down their throats," recording five more albums of the software's

compositions, including an ambitious Rachmaninov concerto that nearly led to another nervous breakdown from lack of sleep and overwork.

For the next decade, he fed off the anger and confusion and kudos from colleagues and admirers. Years after the 1981 opera was to be completed, Cope fed a database of his own works into Emmy. The resulting score was performed to the best reviews of his life. Emmy's principles of recombination and pattern recognition were adapted by architects and stock traders, and Cope experienced a brief burst of fame in the late 1990s, when *The New York Times* and a handful of other publications highlighted his work. Insights from Emmy percolated the literature of musical style and creativity — particularly Emmy's proof-by-example that a common grammar and language underlie almost all music, from Asian to Western classical styles. Eleanor Selfridge-Field, senior researcher at Stanford University's Center for Computer Assisted Research in the Humanities, likens Cope's discoveries to the findings from molecular biology that altered the field of biology.

"He has revealed a lot of essential elements of musical style, and the definition of musical works, and of individual contributions to the evolution of music, that simply haven't been made evident by any other process," she says. "That really is an important contribution to our understanding of music, revealing some things that are really worth knowing."

Nevertheless, by 2004, Cope had received too many calls from well-known musicians who wanted to perform Emmy's compositions but felt her works weren't "special" enough. He'd produced more than 1,000 in the style of several composers, an endless spigot of material that rendered each one almost commonplace. He feared his Emmy work made him another Vivaldi, the famous composer often criticized for writing the same pieces over and over again. Cope, too, felt Emmy had cheated him out of years of productivity as a composer.

"I knew that, eventually, Emmy was going to have to die," he says. During the course of weeks, Cope found every copy of the many databases that comprised Emmy and trashed them. He saved a slice of the data and the Emmy program itself, so he could demonstrate it for academic purposes, and he saved the scores she wrote, so others could play them. But he'd never use Emmy to write again. She was gone.

For years, Cope had been experimenting with a different kind of virtual composer. Instead of software based on re-creation, he hoped to build something with its own personality.

Emily Howell has a musical conversation that includes "words" (white nodes) and the connections between them. (Catherine Karnow)

This program would write music in an odd sort of way. Instead of spitting out a full score, it converses with Cope through the keyboard and mouse. He asks it a musical question, feeding in some compositions or a musical phrase. The program responds with its own musical statement. He says "yes" or "no," and he'll send it more information and then look at the output. The program builds what's called an association network — certain musical statements and relationships between notes are weighted as "good," others as "bad." Eventually, the exchange produces a score, either in sections or as one long piece.

Most of the scores Cope fed in came from Emmy, the once-removed music from history's great composers. The results, however, sound nothing like Emmy or her forebears. "If you stick Mozart with Joplin, they're both tonal, but the output," Cope says, "is going to sound like something rather different."

Because the software was Emmy's "daughter" — and because he wanted to mess with his detractors — Cope gave it the human-sounding name Emily Howell. With Cope's help, Emily Howell has written three original opuses of varying length and style, with another trio in development. Although the first recordings won't be released until February, reactions to live performances and rough cuts have been mixed. One listener compared an Emily Howell work to Stravinsky; others (most of whom have heard

only short excerpts online) continue to attack the very idea of computer composition, with fierce debates breaking out in Internet forums around the world.

At one Santa Cruz concert, the program notes neglected to mention that Emily Howell wasn't a human being, and a chemistry professor and music aficionado in the audience described the performance of a Howell composition as one of the most moving experiences of his musical life. Six months later, when the same professor attended a lecture of Cope's on Emily Howell and heard the same concert played from a recording, Cope remembers him saying, "You know, that's pretty music, but I could tell absolutely, immediately that it was computer-composed. There's no heart or soul or depth to the piece."

That sentiment — present in many recent articles, blog posts and comments about Emily Howell — frustrates Cope. "Most of what I've heard [and read] is the same old crap," he complains. "It's all about machines versus humans, and 'aren't you taking away the last little thing we have left that we can call unique to human beings — creativity?' I just find this so laborious and uncreative."

Emily Howell isn't stealing creativity from people, he says. It's just expressing itself. Cope claims it produced musical ideas he never would have thought about. He's now convinced that, in many ways, machines can be more creative than people. They're able to introduce random notions and reassemble old elements in new ways, without any of the hang-ups or preconceptions of humanity.

"We are so damned biased, even those of us who spend all our lives attempting not to be biased. Just the mere fact that when we like the taste of something, we tend to eat it more than we should. We have our physical body telling us things, and we can't intellectually govern it the way we'd like to," he says.

In other words, humans are more robotic than machines. "The question," Cope says, "isn't whether computers have a soul, but whether humans have a soul."

Cope hopes such queries will attract more composers to give his research another chance. "One of the criticisms composers had of Emmy was: Why the hell was I doing it? What's the point of creating more music, supposedly in the style of composers who are dead? They couldn't understand why I was wasting my time doing this," Cope says.

That's already changed.

"They're seeing this now as competition for themselves. They see it as, 'These works are now in a style we can identify as current, as something that is serious and unique and possibly competitive to our own work,'" Cope says. "If you can compose works fast that are good and that the audience likes, then this is something."

I ask Cope whether he's actually heard well-known composers say they feel threatened by Emily Howell.

"Not yet," he tells me. "The record hasn't come out."

The following afternoon, we walk into Cope's campus office, which seems like another college dorm room/psychic dump, with stacks of compact discs and scores growing from the floor like stalagmites, and empty plastic juice bottles scattered about. The one thing that looks brand-new is the black upright piano against the near wall.

Cope pulls up a chair, removes his Indiana Jones hat and eagerly explains the latest phase of his explorations into musical intelligence. Though he's still poking around with Emily Howell, he's now spending the bulk of his composition time employing on-the-fly programs.

Here's how this cyborg-esque composing technique works: Cope comes up with an idea. For instance, he'll want to have five voices, each of which alternates singing groups of four notes. Or perhaps he'll want to write a piece that moves quickly from the bottom of the piano keyboard to the top, and then back down. He'll rapidly code a program to create a chunk of music that follows those directions.

After working with Emmy and Emily Howell for nearly 30 years and composing for about twice that many, Cope is fast enough to hear something in his head in the bathtub, dry off and get dressed, move to the computer and 10 minutes later have a whole movement of 100 measures ready. It may not be any good, but it's the fastest way to translate his thoughts into a solid rough draft.

"I listen with creative ears, and I hear the music that I want to hear and say, 'You know? That's going to be fabulous,' or 'You know … '" — he makes a spitting noise — "'in the toilet.' And I haven't lost much, even though I've got a whole piece that's in notation immediately."

He compares the process to a sculptor who chops raw shapes out of a block of marble before he teases out the details. Using quick-and-dirty programs as an extension of his brain has made him extraordinarily prolific. It's a process close to what he was hoping for back when he first started working on software to save him from composer's block.

As complex as Cope's current method is, he believes it heralds the future of a new kind of musical creation: armies of computers composing (or helping people compose) original scores.

"I think it's going to happen," Cope says. "I don't believe that composers are stupid people. Ultimately, they're going to use any tool at their disposal to get what they're after, which is, after all, good music they themselves like to listen to. There will be initial withdrawal, but eventually it's going to happen — whether we want it to or not."

Already, at least one prominent pop group — he's signed a confidentiality agreement, so he can't say which one — asked him to use software to help them write new songs. He also points to services like Pandora, which uses algorithms to suggest new music to listeners.

If Cope's vision does come true, it won't be due to any publicity efforts on his part. He'll answer questions from anyone, but he refuses to proactively promote his ideas. He still hasn't told most of his colleagues or close friends about ***Tinman***, a memoir he clandestinely published last year. The attitude, which he settled on at a young age, is to "treat myself as if I'm dead," so he won't affect how his work is received. "If you have to promote it to get people to like it," he asks, "then what have you really achieved?"

Cope has sold tens of thousands of books, had his works performed in prestigious venues and taught many students who evangelize his ideas around the world. Yet he doesn't think it adds up to much. All he ever wanted was to write something truly wonderful, and he doesn't think that's happened yet. As a composer, Cope laments, he remains a "frustrated loser," confused by the fact that he burned so much time on a project that stole him away from composing. He still just wants to create that one piece that changes someone's life — it doesn't matter whether it's composed by one of his programs, or in collaboration with a machine, or with pencil on a sheet of paper.

"I want that little boy or girl to have access to my music so they can play it and get the same thrill I got when I was a kid," he says. "And if that isn't gonna happen, then I've completely failed."

http://www.miller-mccune.com/culture-society/triumph-of-the-cyborg-composer-8507/?utm_source=Newsletter97&utm_medium=email&utm_content=0223&utm_campaign=newsletters

Forecast: Warm With a Chance of Denial

By: Melinda Burns | February 16, 2010 | 14:22 PM (PDT)

Despite the weight of scientific evidence, many TV meteorologists are global warming skeptics, survey shows

Do weathermen themselves "know which way the wind blows"?

A recent national survey of TV weather forecasters, all of them meteorologists, reveals that nearly 1 in 3 believes "global warming is a scam," 1 in 4 is not sure, and three out of four are not convinced that the warming of the Earth since 1950 is man-made.

As reported in the *Bulletin of the American Meteorological Society*, the admittedly small survey sample of 121 forecasters was dominated by climate change skeptics who questioned the findings of the United Nations Intergovernmental Panel on Climate Change, the world authority on global warming, and the conclusions of the professional society to which they belong.

"While healthy skepticism is a hallmark of journalism, these data suggest a deeper cynicism among some on-air forecasters," wrote Kris Wilson, a former weather anchor who performed the survey and wrote the report. Wilson is a geographer and a lecturer in the School of Journalism at the University of Texas at Austin.

"While some said they trusted the IPCC, others said that that organization was 'the most political' and discredited its entire body of evidence," Wilson wrote. "While some considered former Vice President Al Gore as a credible expert, others singled him out for special invectives and disdain, with one of them referring to him as a 'snake-oil salesman.' Ranking third in the category (12%) of 'whom do you trust' was 'Myself.'"

Gore and the intergovernmental panel shared the 2007 Nobel Peace Prize for their work in establishing the scientific foundation for man-made climate change and educating the public about it.

Also in 2007, in recognition of the "vast weight of current scientific understanding" expressed in the panel's reports, the American Meteorological Society issued an "information statement" concluding that "the atmosphere, ocean and land surface are warming" and that "humans have significantly contributed to this change."

The survey was sponsored by the National Environmental Education Foundation, a nonprofit group founded by Congress, to help guide online courses on climate change for broadcast meteorologists. Nearly three-quarters of those surveyed said they were comfortable in their role as the resident scientist at their TV stations, but only one out of five has ever produced a story in the field on climate change. Forty-one percent cited "too much scientific uncertainty" as the "greatest obstacle to reporting on climate change."

When asked about the IPCC's conclusion that "warming of the climate system is unequivocal," only 45 percent of the weathercasters said they agreed with that assessment, and 34 percent flat-out disagreed. Asked to respond to the panel's conclusion that "most of the warming since 1950 is very likely human-induced," half disagreed and another 25 percent had no opinion.

As reported by Miller-McCune.com, Wilson has written previously about how TV weathercasters are "potentially prominent science communicators" who enjoy top audience credibility scores on the air. They spend a lot of time giving talks to community and school groups, which is where they discuss climate change most often. Yet a number do not have degrees in meteorology or atmospheric science, as Wilson's earlier research shows.

Miller-McCune.com has also reported on a 2009 Rasmussen Reports survey showing that while 82 percent of scientists attribute climate change to human activity, only 41 percent of Americans overall agree with that assessment.

It's no wonder: They've probably been listening to their local weatherman.

http://www.miller-mccune.com/science-environment/forecast-warm-with-a-chance-of-denial-9182/

More Power? No, More Empowerment!

By: Anna Davison | February 11, 2010 | 17:30 PM (PDT) |

Nobel laureate Walter Kohn is bullish on renewable energy but sees the answer to global energy woes as population stabilization through the education of women.

Few sectors have weathered the economic storm as well as renewable energy.

During 2009, America's wind power capacity increased by an enviable 39 percent, and the global wind energy market was expected to grow 25 percent. Wind energy has been on the up and up for years now, and solar power has made similarly impressive gains.

If those trends continue, wind and solar power could together be the world's dominant energy source by 2021, according to Nobel laureate-turned-clean-energy-crusader Walter Kohn.

"It's something I foresee and hope for," says Kohn, a nuclear physicist who has spent the last decade or so pushing solar and wind power. (He dismisses nuclear energy because of the potential for proliferation, and biofuels because they require so much water to produce).

Kohn's vision — which he'll discuss in a forthcoming book — isn't some far-fetched greenie fantasy, he argues, but a feasible goal that would mark "a real revolution."

His 2021 estimate is based on calculations that assume no new technology or plunging prices, just that the supply of wind and sun and the raw materials required to transform them into megawatts is essentially inexhaustible, and that the capacity for renewable energy generation continues to grow at the rate it has in recent years.

"We're coming to the end of an age of oil," Kohn said during a speech in the building at the University of California, Santa Barbara, that bears his name: Kohn Hall, which houses the Kavli Institute for Theoretical Physics, which he founded.

Getting there won't be easy, Kohn acknowledges.

"It will make enormous demands on our economy," he says, and with all the work required to roll out the necessary infrastructure, "there won't be any unemployment."

It will be a tough road, for sure, but Kohn's optimism is buoyed by news of groundbreaking clean energy projects like the European Union's "Desertec" plan to deploy solar arrays and wind turbines in the Sahara desert to supply power to Africa and Western Europe.

Yes, energy conservation and increased energy efficiency are important, Kohn says, and technologies like carbon sequestration could someday help, but he sees one standout strategy for addressing 21st-century energy needs and curbing climate change: population stabilization.

Kohn isn't pushing a dictatorial approach like China's one-child edict, or some "totally unacceptable, undemocratic way" of halting population growth. The most cost-effective strategy, he says, is to give women around the globe just as much education as men. Since women with more education have fewer children, "the rest takes care of itself."

Kohn sees most of the progress in that area coming from within women's home countries, although he believes the United States can help by educating women-carefully chosen for their potential to effect change-from developing countries.

Despite predictions that 9 billion people will share the planet by 2040, Kohn believes it's possible to stabilize the world's population by the middle of this century. Achieving that by giving women a better education, he says, "is hard to argue with."

http://www.miller-mccune.com/science-environment/more-power-no-more-empowerment-8758/

The True Cost of Tobacco

By: Elisabeth Best | February 18, 2010 | 14:30 PM (PDT) |

Researchers find that poor smokers' children are the victims of the habit: Their nutrition takes a hit when their parents divert precious resources to pay for tobacco.

The World Health Organization estimates that almost 5 million people die each year from tobacco-related causes, a figure that is expected to double in the next 20 years, especially among the poor in the developing world.Smoking in the developing world is rising by 3.4 percent every year, and with aggressive marketing by tobacco companies there, that growth is likely to be sustained. By 2030, approximately 70 percent of smoking-related deaths worldwide will occur in developing countries.

But the cost of smoking isn't only measured in mortality — it can be measured in dollars or yuan or rupiah, that is to say when the poor spend money on cigarettes, they're not spending it elsewhere.

Stephen Block and Patrick Webb, professors at Tufts University, have linked tobacco use in developing countries to malnutrition in children.Why? Because it decreases the proportion of income spent on food. The pair published their findings in October's edition of the journal Economic Development and Cultural Change.In Indonesia, where 18 percent of the population lives below the poverty line, the smoking rate is approximately 3 percent for women and 60 percent for men. The World Bank estimates that tobacco is the nation's second-biggest business and the second-largest expenditure among the country's poor.

Meanwhile, the Indonesian government has shown little interest in reducing tobacco use, according to professor Hasbullah Thabrany of the Universitas Indonesia, even as other social monitors, like the clergy, have grown concerned enough to issue a fatwa against smoking by kids and pregnant women.

Block and Webb used data from a survey of more than 33,000 households in rural Java to assess the impact of tobacco use on child nutrition. They found that households of nonsmokers spend on average 75 percent of their budget on food, whereas households in which at least one person smokes allocate 68 percent of their budget to food and 10 percent to cigarettes.

"This suggests that 70 percent of the expenditures on tobacco products are financed by a reduction in food expenditures," the researchers write.Households with smokers allocate a larger portion of their food budget to rice, a low-nutrient food, whereas those of nonsmokers spent more on high-quality foods, like meats and vegetables.

Their work echoes that of Sarah Barber of the University of California, Berkeley, and the World Health Organization, who told the Australian Broadcasting Corp. that the tenth of income spent on tobacco, "compares with, for example, 2.1 per cent on health, 1.8 per cent on education, and so what we feel is that households with smokers are dedicating a very, very large amount of money on tobacco and this has serious welfare implications for the rest of their family." (Barber co-authored a paper in the June edition of the Journal of Public Health Policy showing that Indonesia's tax on tobacco, already among the lowest in the world, tends to "promote" affordable tobacco products.)

Block and Webb also found that the average height among preschool children living with smokers is slightly lower than that of children in nonsmoking households, which suggests that the decreased food expenditure in smoking households negatively impacts children's health.Parental education, which has been linked to reduced smoking and improved quality and quantity of food choices, also coincides with increasing average height of preschool children.

Block and Webb argue that smoking has a strong, if indirect, impact on child malnutrition."The combination of direct health threats from smoking coupled with potential loss of consumption among children linked to tobacco expenditure presents a development challenge of the highest order," they assert.But beyond making cigarettes too expensive to buy, can government turn the tide on smoking in developing countries?

For one thing, economic advancement might help, even if in the short term it makes cigarettes more affordable. In America, at least, wealthier people are less likely to smoke. While this finding doesn't apply to a country-level analysis (smoking rates are not necessarily higher in poorer countries), it does suggest some hope.And if Massachusetts is any indication, making it affordable for poor people everywhere to quit smoking might be a step in the right direction.

When Massachusetts began offering next-to-free smoking cessation products in 2006, it hoped to reduce the number of low-income smokers within state lines. New data suggest that it has done so, and fast — by 2008, the proportion of poor smokers in the state dropped from 38 percent to 28 percent, a 30,000-person decrease (but still significantly higher than the rate in the general population, estimated at 21 percent).

The program covers almost the entire cost of counseling and prescription drugs for Medicaid participants, capping copayments at $3. Enrollees aged 18 to 64 are eligible for 180 days of drugs and 16 counseling sessions per year. The total cost to the state was $11 million for the first two years.

Although the data has not yet been peer reviewed, U.S. senators and anti-smoking advocates are already working to include a tobacco addiction provision in the new health care bill. The current Senate health care bill would only allow pregnant women on Medicaid (who are generally advised to avoid smoking-cessation products) to take advantage of lower-cost treatment.

If true, the Massachusetts findings indicate that poor people will quit smoking when given the opportunity to do so affordably.

http://www.miller-mccune.com/health/the-true-cost-of-tobacco-7036/

Teaching an Old Immune System New Tricks

By: Elisabeth Best | February 11, 2010 | 15:47 PM (PDT) |

Researchers have found a protein that may be the immune system's fountain of youth.

Researchers from Germany's Hemholtz Centre for Infection Research may have discovered a treatment to make old immune systems young again. Their results, published in the Journal of Pathology, suggest that a growth protein may have a "fountain of youth" effect on the immune system.The scientists, led by Eva Medina, examined the immune system decline associated with aging. By comparing immune system responses of young mice (2 to 3 months old) and old mice (equivalent of 70- and 80-year-old humans) to bacterial infections, the researchers discovered that as mice age, they lose microphages.Those are a type of cell that fights infecting bacteria. In conjunction with other cells, they form the front lines of the immune system. But as both people and mice grow old, their immune systems change: Infections come more often and with greater intensity.Medina believes that keeping the immune system working longer and better can help people live longer, healthier lives. "Since the immune system protects our body against infections, to keep the immune system young and functional is a crucial factor for healthy aging," she says.Her team looked at the reactions of young and old mice to *Streptococcus pyogenes*, which is probably best known for causing strep throat. But it can also cause life-threatening infections like impetigo, scarlet fever and cellulitis, especially in elderly people. While the young mice were able to fight off the invading bacteria, the older mice – even those infected with fewer bacteria – died.Later, the researchers studied the differences in the immune systems of the young mice and their older counterparts. They found that the aged mice had fewer microphages in their tissue than the younger ones.The team treated the older mice with the specific protein that affects microphage counts to see if it could increase their ability to ward off infections. They found that the repeated preventive treatment did help them maintain their microphages and efficiently fight infective bacteria — a result that may help the elderly stave off disease.

While their research certainly won't help Grandma look like she's 20 again, it may help her immune system act like it.

http://www.miller-mccune.com/science-environment/teaching-an-old-immune-system-new-tricks-8479/

Frog reveals secret of monogamy
By Matt Walker
Editor, Earth News

The first monogamous amphibian has been discovered living in the rainforest of South America.

Genetic tests have revealed that male and females of one species of Peruvian poison frog remain utterly faithful.

More surprising is the discovery that just one thing - the size of the pools of water in which they lay their tadpoles - prevents the frogs straying.

That constitutes the best evidence yet documented that monogamy can have a single cause, say scientists.

Details of the frog's sex life is to be published in the journal The American Naturalist.

These frogs are truly devoted to their offspring, and to each other
Dr Jason Brown Duke University

"This is the first discovery of a truly monogamous amphibian," says biologist Dr Jason Brown, then of East Carolina University in Greenville, North Carolina, who made the discovery with colleagues Dr Victor Morales and Professor Kyle Summers.

The monogamous frog species *Ranitomeya imitator* , known as the mimic poison frog, is already known to science.

In recent years, Dr Brown and his colleagues have extensively studied many of its habits, which were filmed by the BBC natural history documentary series Life in Cold Blood.

After mating, a female mimic poison frog lays her eggs on the surface of leaves.

The male frog then takes away the tadpoles that hatch, carrying them one by one on his back to pools of water which collect in bromeliad leaves high up in the branches of trees.

Each of half a dozen babies are put into their own tiny pool, which he then looks after.

When the tadpoles become hungry, the male calls to his female partner who arrives to lay a non-fertile egg in each pool, which the tadpole eats as food.

But while the male and female frogs appear to act in unison, new experiments have revealed the extent of their fidelity.

Many animals appear to be monogamous, with males and females forming pairs that can often last a lifetime.

But the recent explosion in genetic analyses has revealed many of these so-called monogamous relationships to be a sham.

While many animals might stay together and breed, they will often sneak off and cheat on their partners when they get a chance.

So Dr Brown and his colleagues decided to check out the mimic poison frog more closely.

They sampled the DNA of many pairs of adult frogs, and the subsequent generations of tadpoles they produced.

Of 12 frog families, 11 had males and females that remained continually faithful to one another, together producing all their offspring. In the twelfth family, a male frog mated with two females.

"Others have found evidence of social monogamy in amphibians where parents remain paired, however they didn't look at the genetics of these couples and their offspring to confirm this," Dr Brown told the BBC.

"Or they have looked at the genetics and observed that they are actually promiscuous."

So that makes the mimic poison frog the first confirmed monogamous amphibian.

That contrasts with another closely related frog called the variable poison frog, which the mimic poison frog imitates, having a very similar colour pattern.

Genetic tests on the variable poison frog (*Ranitomeya variabilis)* by the researchers show it is promiscuous.

Further research by the team has also revealed why the two frogs, similar in so many ways, are sexually very different.

The variable poison frog lays its eggs in much bigger pools of water, five times as large on average than those used by the mimic poison frog.

Also, the female plays no part in their raising, leaving their care to the male frog only.

When the researchers moved tadpoles from both species into different sized pools, they found that the tadpoles grew quickly in the larger pools, which contain more nutrients, but could not survive alone in smaller ones.

That strongly suggests that variable poison frogs don't need to stick together, as their tadpoles can survive in larger pools without feeding from their mothers.

Mimic poison frogs have been forced to take a different path, however.

Their tadpoles cannot survive without the care of both their father and mother, as there is too little natural food in their smaller pools.

So the adult frogs stick together.

Overall, the researchers believe they have found convincing evidence of an evolutionary chain of causation: changing the breeding pool size forced the mimic poison frog to change its system of parental care, with males and females working together. That then culminated in social and genetic monogamy.

If the pools were bigger, the frogs wouldn't have to remain faithful, as they wouldn't be tied by their need to work together to raise their brood.

"These frogs are truly devoted to their offspring, and to each other," says Dr Brown, who is now studying at Duke University in Durham, North Carolina, US.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/earth/hi/earth_news/newsid_8524000/8524558.stm

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Threat from e-waste 'mountains'

Urgent action is needed to tackle the "mountains" of e-waste building up in developing nations, says a UN report.

Huge amounts of old computers and discarded electronic goods are piling up in countries such as China, India and some Africa nations, it said.

India could see a 500% rise in the number of old computers dumped by 2020, found the survey of 11 nations.

Unless dealt with properly the waste could cause environmental damage and threaten public health, it said.

Precious hazard

The report gathered information about current levels of e-waste in 11 nations and also looked at how those totals might grow in the next decade.

Globally, e-waste is growing at a rate of about 40 million tonnes per year as consumers, in both developed and developing nations, buy new gadgets and discard their old ones.

Many of the older items end up in developing nations. By 2020, China and South Africa could see e-waste generated by old computers rise by 400% by 2007 levels.

In a decade, estimated the report, e-waste from mobile phones will be seven times higher in China and 18 times higher in India.

Some nations are happy to take in e-waste to use in order to extract some of the precious materials and metals that go into making modern consumer electronics.

For instance, said the report, in an average year global production of mobile phones and computers uses 3% of the silver and gold mined, 13% of the palladium and 15% of the cobalt.

However, it found, in some places efforts to extract these metals are inefficient and do not do enough to handle the hazardous materials recovery produces.

For instance, it said, e-waste treatment in China typically involved back yard incinerators which were a wasteful and polluting way to recover precious materials.

"China is not alone in facing a serious challenge," said Achim Steiner, executive director of the UN Environmental Programme (UNEP) which issued the report. "India, Brazil, Mexico and others may also face rising environmental damage and health problems if e-waste recycling is left to the vagaries of the informal sector."

The report said Bangalore in India was a good example of how local initiatives could reform the gathering and treatment of e-waste.

It urged nations such as Brazil, Colombia, Mexico, Morocco and South Africa to set up state-of-the-art e-waste treatment centres now, while the amounts they produced were relatively small.

"One person's waste can be another's raw material," said Konrad Osterwalder, rector of the UN University. "The challenge of dealing with e-waste represents an important step in the transition to a green economy."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/technology/8528066.stm

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The happy place on the podium

The Globe and Mail

Getty Images

By **Adriana Barton**, The Globe and Mail Posted Thursday, February 18, 2010 12:49 AM ET

VANCOUVER - When Shannon Bahrke won bronze in women's moguls Saturday, she hugged first-place winner Hannah Kearney so tightly that she almost knocked her U.S. teammate over.

Under the cloud cover of Cypress Mountain, Ms. Bahrke was seeing the bronze lining. By contrast, Canadian skier Jennifer Heil looked crestfallen after taking silver.

According to experts, Ms. Bahrke's ecstatic reaction wasn't simply due to her bubbly personality.

"On average, bronze medalists are happier than silver medalists," said Victoria Medvec, a psychologist and professor at Northwestern University's Kellogg School of Managementv in Illinois.

The phenomenon is a case of counterfactual thinking - thoughts about "what might have been," she explained.

Third-place winners have upward thoughts ("at least I won") that increase satisfaction, researchers have found, whereas those who come in second tend to have downward "if only" thoughts that decrease happiness.

The most telling study involving athletes used footage from medal ceremonies at the 1992 Summer Olympics in Barcelona.

Researchers including Dr. Medvec asked subjects to rate the satisfaction of bronze and silver medal winners based on their facial expressions.

The study revealed a disconnect between performance and satisfaction, said Dr. Medvec.

"Those who perform objectively better can actually feel worse than those who they outperformed."

Expectations from sponsors, teammates and fans can contribute to an athlete's sense of disappointment, according to Saul Miller, a Vancouver-based clinical psychologist and author of Performing Under Pressure: Gaining the Mental Edge in Business and Sport.

For an athlete like Ms. Heil - lauded as Canada's first hope of a gold medal on native soil - "winning silver is a mixed thing," he said.

Olympic slogans emphasize participation over winning, Dr. Miller pointed out, but "that's a bit of bullshit these days."

According to Dr. Miller, the prevailing attitude is summed up in a controversial 1996 Nike ad, which said "You don't win silver - you lose gold."

Ms. Heil was blunt with reporters after taking second place: "There's no doubt about it, I was going for gold."

No one goes for bronze, Ms. Bahrke said.

Unlike Ms. Heil, however, she wasn't considered a shoo-in for the podium.

"Just being recognized as one of the top three Olympic skiers is truly an honour," she said.

Ms. Bahrke won a silver medal at the Winter Games in Salt Lake City, Utah. Then aged 21, Ms. Bahrke was "in shock" on the podium, she said, and didn't understand the scope of the Olympics.

Eight years later, with a bronze medal in Vancouver, Ms. Bahrke became the first U.S. women's freestyle skier to win multiple Olympic medals.

Ms. Bahrke says she prizes the bronze even more than her silver medal, which is locked in a safety deposit box in Salt Lake City.

"This one means a lot more," she said. "I've been pretty much sleeping with it."

The 29-year-old skier said she plans to retire from competition, and on 10/10/10, she will marry her long-time boyfriend, Matt Happe.

"It's great," she said. "I'm going to be 'Mrs. Happy.'"

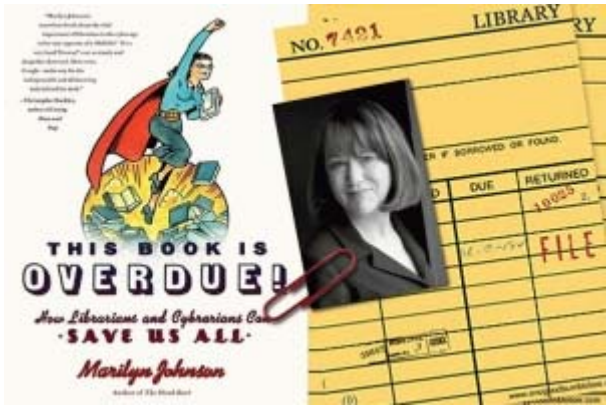
http://www.ctvolympics.ca/news-centre/newsid=45218.html

"This Book Is Overdue!": Hot for librarian

The author of a new book talks about the secret lives of America's favorite -- and endangered -- disciplinarians

By Jed Lipinski

Feb. 21, 2010 |



Behold the stereotypical librarian, with her cat's-eye glasses, bun and pantyhose -- a creature whose desexualized persona and desire for us to be quiet has fueled generations of wild sexual fantasies. But there's bad news for those of you with a shushing fetish; as Marilyn Johnson explains in "This Book Is Overdue!: How Librarians and Cybrarians Can Save Us All," the uptight librarian is a species that's rapidly approaching extinction.

A new generation of young, hip and occasionally tattooed librarians is driving them out. They call themselves guybrarians, cybrarians and "information specialists," and they blog at sites like The Free Range Librarian and The Lipstick Librarian. They can be found in droves on Second Life, but also outside the Republican National Convention, dodging tear gas canisters and tweeting the location of the police.

Johnson, a former staff writer for Life magazine, and author of "The Dead Beat," a book about the fascinating world of obituary writing, delights in refuting our assumptions about librarians, while making a rock-solid case for their indispensability at a time when library systems are losing an average of 50 librarians per year. Who else is going to help us formulate the questions Google doesn't understand, or show non-English speakers how to apply for jobs online, or sympathize with your need to research the ancient origins of cockfighting? Librarians, Johnson argues, are one of our most underappreciated natural resources.

Salon talked to Johnson over the phone from her home in Westchester County, in New York, about the inadequacy of Google, why librarians have so many stalkers, and how a group of Connecticut librarians helped protect your privacy.

How did you know that librarians, not exactly known for their wild personalities, would make such riveting subjects?

My first book, "The Dead Beat," was about obituaries, and during my research I realized that the most engaging obits were about librarians. I once told a writer who was mentoring me that I wanted to write a book about them, and he threw back his head and howled, like, "Are you trying deliberately to stay off of

the bestseller list?" But then he told me this great librarian story. That happened over and over. People would laugh, then tell me a fascinating story.

I met a librarian who had gone and embedded herself with troops in Iraq because she wanted to find out what was happening there. Her name is Shelby Monroe. She has a Web site: 101 Days With the 101st Division. Then there was the belly-dancing librarian, and the 53-year-old, quite attractive librarian from Ohio who discovered her inner roller derby queen and joined a roller derby team. She calls herself MegaBeth. I think librarians enjoy shocking people.

Aren't libraries and librarians obsolete in the age of Google?

Go to a library. Most people haven't seen what's happened. Since the '90s, libraries have become computer centers, Blockbusters and community centers, all in one. We have this illusion that you can find anything on the Web, that you can type in a keyword and the world will open up. But you can get a lot of garbage and wrong information, and many, many things get lost in cyberspace or do not appear in digital form.

As for librarians, they're civil servants. They deal with all kinds of social welfare problems, from childcare to homelessness to people who can't navigate the bureaucracy to get benefits or help finding a job. The buck stops at the library. If we keep cutting library aid, people who can't figure out how to file for taxes, or how to use e-mail, are going to be out of luck. About 20 percent of the population is not wired; they don't have Internet access or a smart phone. They can't go to Starbucks and get Wi-Fi with their $4 latte.

We have an image of the archetypal librarian, with the bun and the glasses. What does a librarian look like today?

Ah, you're asking for trouble with this one. It's an interesting time to try to pick a librarian out of a lineup. Some of them look like little cartoon characters, some of them like the hippest, most tattooed, multicolored-hair person at a Weezer concert. This was a problem when we came up with an image of the cover for the book. I felt bad that it was a white woman with glasses. There are so many other variations on the model now. There are tons of male librarians who are out there being very mouthy and articulating what librarianship should be now. One of them, Stephen Abram, looks like a CEO in a million-dollar suit. Another walks around with a bandanna and a tool belt.

You write that librarians have a lot of stalker problems. Is librarian stalking really that common?

Oh yeah. Librarians don't like to wear name tags, because there are a lot of crazies out there and sometimes people fixate on librarians. Being friendly and helpful when you're dealing with the public can be tricky. I know a very attractive librarian who will not walk alone to the parking lot. But lots of them have a great sense of humor about their image as sexy librarians, and they love toying with that stereotype. You can find blogs for the Depraved Librarian and the Society for Librarians Who Say Motherfucker on the Web (and a whole lot of others, besides) and a collection of images of naked librarians maintained by a librarian.

You write about the debaucherous goings-on at the American Library Association's convention. What are book-cart drills?

I love those! I stumbled into a competition at my first ALA conference. A half dozen or so teams of librarians from across the country got together and rehearsed these drills with costumes, loud music and book carts! I saw one librarian spin a book cart on one wheel. I think that was the equivalent of landing the first triple axel in the Olympics. There are quite a few of these drills on YouTube, including one of a group of librarians prancing around to the song "Librarian," and wiggling suggestively to lyrics like "I

want to check out your books." All that, and they can help you set up a business, and research a charity, and get ideas for throwing children's parties.

You mention that libraries may be the last place, other than your home, where information comes free of charge. That's a pretty scary thought.

It's true. At a library you're not assaulted by loaded or manipulated messages. I like to go to the Apple Store and work on projects with the geniuses there, but I also walk out with Apple merchandise. They're teaching me, but they're not teaching me about Windows. You have to be on guard everywhere in this culture; all information is loaded. But it's not as if things aren't being bought at the library. Books, materials, access to the databases all cost money, and librarians make choices. But they don't turn around and sell us things. And if you ask a reference librarian which washing machine is the best buy, he or she will be as neutral as Consumers Digest. The library is a great place to go to sort out wild political claims. Verifiable information -- the truth -- is their standard.

One chapter of the book describes your involvement with librarians on Second Life, which seems like maybe the ultimate geek activity. Could Second Life represent the future of libraries?

Well, I think the whole Web is going to look something like Second Life someday soon. You'll be able to project yourself into the screen and navigate pages that feel three-dimensional. I got to go on Second Life and sit in a meeting with librarians from Scotland, Australia, Germany, Africa, China, and have sidebar conversations about the future of the field as a presentation was taking place. Librarians are real pioneers, out there inventing ways to engage in virtual reality, reinventing libraries using pixels and digital resources, and figuring out how to be useful to inventors and explorers of this and other kinds of cutting-edge software.

It was weird and colorful and exciting, and as I described in the book, I had a number of old-fashioned library experiences in the futuristic world of Second Life that delighted me. I dressed up my avatar like a 19th-century duchess and sat in a beautiful garden and talked with smart people from around the world about "Alice in Wonderland." Very trippy!

Librarians are considered pretty passive people, yet they were some of the strongest opponents of the Patriot Act. A group of them even sued the U.S. government to keep their patrons' records private. How did they manage that?

Like doctors and teachers, librarians have a code of ethics. And foremost in that code is their assurance that if you check out the shared resources in the library, or ask a librarian for help of a sensitive or personal nature, they are not going to betray your confidence.

When the USA Patriot Act was passed into law, the FBI started sending out National Security Letters, asking for patrons' records. And these NSLs carried gag orders with them. If you got a letter, you could never tell anyone -- ever -- that you had been asked for information by the FBI. You risked prison time if you spilled those beans.

But when Library Connection, a consortium in Connecticut, received an NSL, its officers decided to challenge its constitutionality in court. They sued as John Doe and had to maintain absolute secrecy until the courts finally dropped the case. Though there was no ruling on the constitutionality, as the librarians had hoped, their gag order was dropped, and to date, they are the only recipients of an NSL who can speak about this incursion into our traditionally private records with authority. The act, by the way, is still on the books. Chances are very good that the FBI has your library records.

-- By Jed Lipinski

http://www.salon.com/books/feature/2010/02/21/interview_marilyn_johnson_librarians/index.html

Imaginary fiends

In 2009, crime went down. In fact it's been going down for a decade. But more and more Americans believe it's getting worse. Why do we refuse to believe the good news?

By Joe Keohane | February 14, 2010

The year 2009 was a grim one for many Americans, but there was one pleasant surprise amid all the drear: Citizens, though ground down and nerve-racked by the recession, still somehow resisted the urge to rob and kill one another, and they resisted in impressive numbers. Across the country, FBI data show that crime last year fell to lows unseen since the 1960s - part of a long trend that has seen crime fall steeply in the United States since the mid-1990s.

At the same time, however, another change has taken place: a steady rise in the percentage of Americans who believe crime is getting *worse*. The vast majority of Americans - nearly three-quarters of the population - thought crime got worse in the United States in 2009, according to Gallup's annual crime attitudes poll. That, too, is part of a running trend. As crime rates have dropped for the past decade, the public belief in worsening crime has steadily grown. The more lawful the country gets, the more lawless we imagine it to be.

The implications for the country at large are stark. Democracy is based on an informed public calling upon its representatives to address problems facing their society. If we believe crime is on the march in the streets all over the country, it influences our beliefs on critical issues

from gun control to sentencing laws, from how we run our prisons to how much money we spend on law enforcement. Misinformation on the part of the public makes for bad lawmaking on the part of the government.

How did we get this idea in our heads? Why do we persist in believing the United States is inexorably sliding into lawlessness when we should be rejoicing that exactly the opposite is happening? The short answer is that we've been taking our cues on crime from a host of things that are both abstract and wholly unrelated to crime. And perhaps, by understanding why we've come to believe what we believe, we can take some steps toward mending our relationship with reality.

Take murder. The murder rate rose and fell over the 20th century, climbing to an early peak in 1933, then dropping sharply and staying low through the Depression, World War II, and into the 1960s. It rose to a record level in 1974, broke that record in 1980, and stayed prodigiously bloody through the early '90s. This is when Bill Clinton boosted funding for local police forces, and police began experimenting with radical new approaches to policing, such as those employed in the so-called Boston Miracle. In 1994, the murder rate started to fall, and it's been falling ever since. Rape, robbery, and aggravated assault have dropped along with it. Last year was no exception. According to preliminary FBI data, the murder rate dropped 10 percent from 2008 to 2009, robbery fell 6.5 percent, aggravated assault fell 3.2 percent, auto theft was down a whopping 18.7 percent.

But as the crime rate has dropped, Americans have missed the news. The number of people who told Gallup that crime is getting worse climbed to 74 percent last year, a figure higher than any year since the carnage of the early '90s.

Part of the reason for this divergence is what sociologists call pessimistic bias: the unshakable conviction that things are not just worse than they are, but also worse than they used to be. Humans appear to have a hard-wired tendency to compare contemporary life with largely fictitious good old days, in which all schools were top-notch, politicians had integrity, children behaved, and crime was nil. This happens in good times and in bad. For instance, over a 20-year period concluding in 1994, the administrators of the General Social Survey, a major effort run out of the University of Chicago, asked respondents if the lot of the common man was getting worse. On average, through booms and busts, a glum 61 percent said yes. This is neither a contemporary phenomenon, nor one specific to America. In 1848, writer Thomas Macaulay wrote in his "The History of England" that "In spite of evidence, many will still imagine to themselves the England of the Stuarts as a more pleasant country than the England in which we live. It may at first sight seem strange that society, while constantly moving forward with eager speed, should be constantly looking backward with tender regret."

Researchers also argue that this pessimistic bias can be exacerbated by certain modern factors. The news media come in for a share of the blame, eagerly meeting a consumer demand for gore and tragedy, while spending nowhere near as much energy explaining the reassuring but dry facts in the background. In a normal person's memory, the emotional impact of watching a single crime story can outweigh even the most persuasive statistics in the newspaper. Arthur Lurigio, a professor of psychology and criminal justice at Loyola University Chicago, says one of the things that will keep people from recognizing that crime is in fact down is their "inability to understand and respond to crime statistics with their viscera."

But while these quintessentially human inclinations would explain the ever-present gap between reality and perception when it comes to crime, they don't account for how drastically reality and perception have parted ways since 2001. It was one thing to believe crime was worsening in the early '90s, because rates were near an all-time high, but now that we have what we want - a comparatively low crime rate - we refuse to believe it. The divergence has left even a lot of researchers mystified. "It's definitely a puzzle," said Lydia Saad, a Gallup senior editor who works on the poll. Stanford Law School professor Lawrence

M. Friedman responded to an e-mail asking for possible explanations by writing, “The bottom line is, we just don’t know.” Bryan Caplan, an economics professor at George Mason University who has written about the phenomenon, said, “It’s one thing to be more pessimistic than is justified. It’s another thing if your pessimism isn’t even responsive to objective reality.”While they and numerous other experts were quick to point out that there’s no data-driven explanation for the phenomenon, one key may lie in the results from a poll that Gallup took early in the decade. There was one real outlier in the 20-year history of this poll, a month in which only 43 percent of Americans thought crime was getting worse, an all-time low: October 2001.

“That was right after Sept. 11,” said Saad, “and people were so positive about America that I think the enemy was perceived to be much more outside the country than inside the country.” Suddenly Americans, even amid the fresh trauma, felt optimistic about the prospects of our nation and the character of our countrymen. We decided to put aside bickering and divisiveness and face the uncertainties of this new world together, as one.

Then that ended. The scary “Other” that had been banished from the country after Sept. 11 soon reestablished residence, and in 2002, American worries about crime resumed their upward march. The Gallup poll that year found that 62 percent of Americans believed crime had increased over the previous year - while in reality, according to FBI statistics, crime had fallen by 1.1 percent.If our perception of crime doesn’t track actual crime rates, what does it track? One answer is satisfaction with the country. According to Gallup, from 1992 to 2001, respondents’ perception of crime fell as their satisfaction with the country rose. After 2001, however, satisfaction with the country has dropped precipitously, from 67 percent in 2001 to 9 percent in 2008, while perception of crime has risen.

The increasingly divisive partisanship of the past two decades may also play a role. Political scientists have found again and again that when the other party has the White House, hard-core partisans will invariably think the country is doing worse than it is. According to Gallup data, in 2004, for example, with a Republican in the White House, 67 percent of Democrats believed crime was up, to the Republicans’ 39 percent. Once Barack Obama was elected, however, the percentage of Republicans who believed crime was rising jumped from 63 to 79, while Democrats stubbornly held at 72. “People are extraordinarily partisan in the way they answer questions about the national scene,” says Gallup’s Saad. And the more partisan the country becomes, the stronger this effect is likely to be.

Harvard University sociologist Robert Sampson sees a different kind of social cause for perceptions of crime: the rapidly changing composition of the population. Sampson has found that people interpret increasing levels of diversity in their neighborhoods in much the same way they interpret physical disorder - that is to say, as an indicator of rising crime. (History suggests this is exactly backward: Murder, for instance, tends to fall during immigration booms.) Sampson believes the same thing may well be happening on a national scale, as the United States becomes a majority-minority nation and the established groups begin to look upon newcomers as yet more evidence that the nation is moving further away from their own beloved good old days.So what, if anything, will bring the high-crime America that exists in our heads in line with the increasingly safe nation we live in? One encouraging finding of the Gallup poll is that people have a far more accurate sense of crime in their own neighborhoods than they do about the rest of the country: When asked about their immediate surroundings, a smaller percentage believe crime to be going up. In other words, we are capable of processing this type of information, as long as it’s gained through firsthand experience. When it’s based on something else - when we’re asked to guess what the rest of the country is like - there’s a lot more room for our moods and our fears to shape the answer. The turning point may come, then, when we begin to realize that the country is nothing more than a collection of such neighborhoods. And that all those other neighborhoods out there - the ones we seem to believe are sliding toward total anarchy - are a lot more like ours then we’ve been willing to admit.

Joe Keohane is a writer in New York. ■

http://www.boston.com/bostonglobe/ideas/articles/2010/02/14/imaginary_fiends/?page=full

The sweet smell of morality

How scent can shape our thinking

By Courtney Humphries | February 14, 2010

Can a clean smell make you a better person?

That's the provocative suggestion of a recent study in the journal Psychological Science. A team of researchers found that when people were in a room recently spritzed with a citrus-scented cleanser, they behaved more fairly when playing a classic trust game. In another experiment, the smell of cleanser made subjects more likely to volunteer for a charity.

The findings suggest that simply smelling something clean makes people clean up their behavior - that a smell can provoke a mental leap between cleanliness and morality, making people think differently about the world around them. The authors even suggested that clean smells could be employed as a tool to influence how people act.

The idea that a smell can affect something as complex as ethical behavior seems surprising, not least because smell has long been seen as a "lower" sense, playing on our emotions and instincts while our reason and judgment operate on another plane. But research increasingly shows that smell doesn't just affect how we feel: It affects how we think, in ways that are just beginning to be understood.

Other studies have confirmed that scents can trigger generosity, and that they affect our decision-making processes and judgments rather than just emotions. Even when smells aren't on the forefront of our consciousness, our minds are trying to match them with other sensory information to interpret our surroundings.

The sense of smell, it turns out, is more complex and influential than once thought. Marketers are already trying to use smells in new ways to shape our spending. And a better understanding of smell has broader implications as well, helping explain the hidden forces that motivate our perceptions and behavior, and even opening up new ways for us to experience the world.

In the hierarchy of the senses, smell has long been relegated to the bottom. Higher communication takes place through our eyes and ears, the thinking goes, whereas the nose is something animals rely on to survive. This notion has a deep history in Western thought: The philosopher Immanuel Kant wrote that there was no point in cultivating the sense of smell since it was primarily a way to help us avoid unhealthy air and spoiled food; Georg Hegel saw smell as a practical sense removed from the realm of aesthetics and intellect.

In some ways, they were on to something: The olfactory system, which detects and processes scents, links directly with the limbic system of the brain, which is involved in emotions and memory. This tight connection explains why you might suddenly feel a profound nostalgia when encountering a smell from your childhood, or why your stomach may turn when catching a whiff of an ex's signature fragrance. And the olfactory system, out of all the senses, is uniquely evolved to guide our behavior in matters of basic survival: finding food, choosing a mate, bonding with family, fleeing danger.

This is still the primary way smell is used commercially, as a way to directly access our appetites and emotions. As a persuasive tool, scent is often used as a binary lever of attraction and disgust: The smell of cinnamon buns or roasted coffee stokes our hunger; the scent added to natural gas alerts us to danger. The smell of Axe body spray supposedly makes a man irresistible to women.

But this is also a simplistic view of smell, says Avery Gilbert, a scent psychologist and author of "What the Nose Knows: The Science of Smell in Everyday Life," who has been trying to debunk what he calls the "raging reptilian brain" view of smell. The idea that smells tap into primal, subconscious parts of our brain is overstated, he says: "People have talked themselves into believing that smell is purely an emotional sense." But in fact, we evaluate smells with some of the same cognitive processes that we use to analyze other sensory information. Our responses to smells can change with experience and learning. We can educate our noses to better identify and analyze the smells in our environment, and to better understand how we respond to them.

Psychology studies suggest strongly that smell affects our behavior in ways that have nothing to do with appetite. Those scents of cinnamon buns and coffee? A study found that people in a mall were more likely to help another person by picking up a dropped pen when one of these two scents was wafting through the air rather than in an unscented part of the mall. A study in France found that when a woman dropped an object from her purse in front of a stranger, the other person was more likely to pick it up and hand it to her when she was wearing perfume. These, like the recent study on clean smells, suggest that scents can influence our social and moral behavior, something we assume to be under our rational control.

It's tempting to conclude that good scents simply elevate our mood, which makes us inclined to be more helpful or generous. But scent marketing research shows that the effects of smells are more complex; they change the way we think, not just how we feel. Maureen Morrin, a marketing professor at Rutgers University, tested the effects of scented air on the spending behavior of shoppers in a mall. First she divided the shoppers into different types - those who shop impulsively and those who plan their purchases ahead of time. Surprisingly, it was the more contemplative shoppers who spent more money when scent was in the air.

Morrin says her other research also suggests that the effect of scent on shopping behavior has less to do with mood than with thought. "Almost all the studies I've done do not show a mood effect" of smell, she says. Instead, smell affects how shoppers choose which stores to visit, how many items they compare, and how they evaluate purchases - all aspects of shopping that Morrin says are cognitive processes.

If smells do work on us subconsciously and tap into deep parts of our brain that we are powerless to control, then the use of ambient scents as marketing tools might seem alarmingly manipulative. But Eric Spangenberg, dean of the College of Business at Washington State University who has studied scent marketing, says it's a mistake to assume that this is how these smells operate. "It's not at all subliminal, it's peripheral," he says. In other words, we're aware of the smells, perceiving and processing them the

way we do background music and decor. We take them in quickly and use them to make judgments about the space we're in.

Scent marketers are already trying to use this knowledge to deploy smells in more sophisticated ways. Harald Vogt, founder of the Scent Marketing Institute, an organization that monitors and promotes the industry, says that the simple salivation strategy - pumping in the smell of food at the point of sale to get customers to crave it - is waning. Instead, companies are trying to create signature scents that customers will associate with a particular brand or experience, like the sweet fig aroma greeting visitors in every Sheraton Hotel lobby. Because the memories we form through scent can persist longer than other kinds of information, smells are seen as a way to form stronger brand associations.

One industry has long treated smell as a complex phenomenon: the perfume business. Highly trained perfume experts, or "noses," consider scent to be a language that can convey subtle messages to different audiences. Through training, they learn to identify and blend hundreds of different smells to achieve their effects. Certain aldehydes blended with florals convey sophistication; citrus conveys freshness. In combination, their messages change, the way new words alter a sentence.

Science is just beginning to address how we learn to identify, categorize, and make meaning out of scents. One intriguing finding is that smell may be a two-way street. Jay Gottfried, a cognitive neuroscientist who studies smell at Northwestern University, has led brain imaging studies showing that an area in the cortex of the brain - typically associated with higher-order functions like decision-making - becomes active when people are paying attention to scents, and seems to help them learn new smells and refine their perceptions. Science on human olfaction, he says, has traditionally taken a very "bottom-up" view of smell: A scent activates a particular olfactory receptor, which is registered in the brain. Now, scientists are increasingly aware that not only can smell affect our thoughts, but thoughts can affect what we smell. "Learning, experience, present context, past associations - all of these things can influence how you perceive a smell at any given time," he says.

That means that there is a value to educating our noses - it can, literally, change how we experience the world. Gottfried found that when subjects were exposed to the smell of mint, they became "experts" in identifying and distinguishing different types of mints, such as spearmint, wintergreen, or peppermint. In another study, when people sniffed two different chemicals that humans perceive as smelling identical, but one chemical was accompanied by mild electric shocks, they learned to tell the difference between the two. In both cases, their sensory landscape was suddenly richer. "With learning and experience and interest, you can optimize your nose and get it to detect and discriminate things that one might not think was possible," he says.

But it's not just a matter of identifying scents; we can also become more aware of the messages and meanings they convey. This opens up a type of intelligence that often gets overlooked in simplistic views of the senses. Rather than being passive consumers of smells, we can actively engage with the smellscapes that surround us, and the messages they hold - whether they are telling us to buy more, feel happier, or behave more fairly. And maybe, the next time your nose tells you to have a cinnamon bun, you can talk back.

Courtney Humphries is a science writer and author of "Superdove: How the Pigeon Took Manhattan...and the World." ■

http://www.boston.com/bostonglobe/ideas/articles/2010/02/14/the_sweet_smell_of_morality/

From ocean to ozone: Earth's nine life-support Systems

UP TO now, the Earth has been very kind to us. Most of our achievements in the past 10,000 years - farming, culture, cities, industrialisation and the raising of our numbers from a million or so to almost 7 billion - happened during an unusually benign period when Earth's natural regulatory systems kept everything from the climate to the supply of fresh water inside narrow, comfortable boundaries.

This balmy springtime for humanity is known as the Holocene. But we are now in a new era, the Anthropocene, defined by human domination of the key systems that maintain the conditions of the planet. We have grabbed the controls of spaceship Earth, but in our reckless desire to "boldly go", we may have forgotten the importance of maintaining its life-support systems.

The demands of nearly 7 billion humans are stretching Earth to breaking point. We know about climate change, but what about other threats? To what extent do pollution, acidifying oceans, mass extinctions, dead zones in the sea and other environmental problems really matter? We can't keep stressing these systems indefinitely, but at what point will they bite back?

Last year, Johan Rockström, director of the Stockholm Environment Institute in Sweden, sat down with a team of 28 luminaries from environmental and earth-systems science to answer those questions. The team included Nobel laureate Paul Crutzen, NASA climate scientist James Hansen, Gaia researcher and "tipping point" specialist Tim Lenton, and the German chancellor's chief climate adviser Hans Joachim Schellnhuber.

They identified nine "planetary life-support systems" that are vital for human survival. They then quantified how far we have pushed them already, and estimated how much further we can go without threatening our own survival. Beyond certain boundaries, they warned, we risk causing "irreversible and abrupt environmental change" that could make the Earth a much less hospitable place (*Ecology and Society*, vol 14, p 32).

The boundaries, Rockström stresses, are "rough, first estimates only, surrounded by large uncertainties and knowledge gaps". They also interact with one another in complex and poorly understood ways. But

he says the concept of boundaries is an advance on the usual approach taken by environmentalists, who simply aim to minimise all human impacts on the planet. Instead, he says, boundaries give us some breathing space. They define a "safe space for human development". And here they are.

However you cut it, our life-support systems are not in good shape. Three of nine boundaries - climate change, biodiversity and nitrogen fixation - have been exceeded. We are fast approaching boundaries for the use of fresh water and land, and the ocean acidification boundary seems to be looming in some oceans. For two of the remaining three, we do not yet have the science to even guess where the boundaries are.

That leaves one piece of good news. Having come close to destroying the ozone layer, exposing both ourselves and ecosystems to dangerous ultraviolet radiation, we have successfully stepped back from the brink. The ozone hole is gradually healing. That lifeline has been grabbed. At least it shows action is possible - and can be successful.

Fred Pearce is New Scientist's senior environment correspondent

http://www.newscientist.com/special/ocean-to-ozone-earths-nine-life-support-systems?DCMP=NLC-nletter&nsref=earthsninelife

Acid oceans

- 18:00 24 February 2010 by **Fred Pearce**
- Magazine issue 2749.
- 

Corals are at risk from ocean acidification (Image: Andre Seale/SplashdownDirect/Rex Features)

Boundary: Global average aragonite "saturation ratio" no lower than 2.75:1

Pre-industrial level: 3.44:1

Current level: 2.90:1

Diagnosis: Safe for now, but some oceans will cross the threshold by mid-century

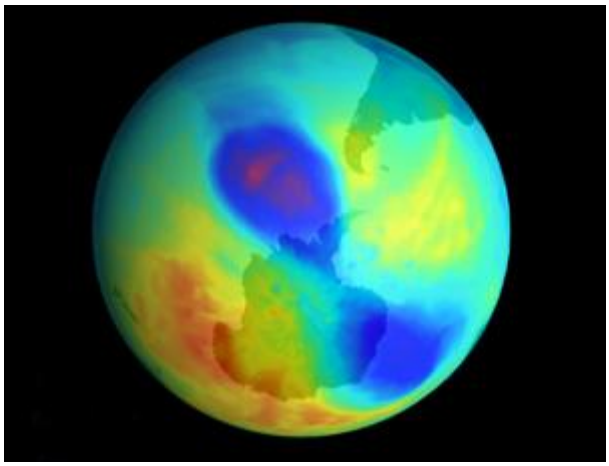
This is a relatively new issue, rarely discussed until 10 years ago. More carbon dioxide in the atmosphere means more is absorbed by the oceans, creating carbonic acid. Since the industrial revolution, the pH of the ocean surface has fallen from 8.16 to 8.05, equivalent to a 30 per cent increase in the concentration of hydrogen ions.Acidification per se isn't a problem, but it has serious knock-on effects on other aspects of ocean chemistry. The most important of these is that it lowers the amount of calcium carbonate dissolved in surface waters.This doesn't matter much right now. But a critical point will be reached if waters become too low in aragonite, a form of calcium carbonate used by many organisms, including corals, to build their shells. Below a certain threshold, aragonite shells and coral dissolve in seawater.

So far, the average aragonite "saturation ratio" in the oceans has fallen from a pre-industrial level of 3.44:1 to 2.9:1. That means, on average, that there is still almost three times as much aragonite as is necessary to keep shells from dissolving. There are wide regional variations, however, and recent studies suggest parts of the Arctic and Southern Oceans could drop below the crucial aragonite saturation ratio of 1:1 by 2050.Nobody knows quite what would happen then. Some species might be eaten away by the acidic water. It could be the coup de grâce for many corals already poisoned by pollution and bleached by warming waters. Emptier oceans would be able to absorb less CO_2, accelerating global warming. To prevent any ocean waters from entering this parlous state, Rockström proposes keeping the average global aragonite saturation ratio above 2.75:1. That would mean keeping atmospheric CO_2 levels below about 430 parts per million, which is lower than the 450 ppm that scientists say is the safe upper limit for global warming.

http://www.newscientist.com/article/dn18571-earths-nine-lifesupport-systems-acid-oceans.html

Earth's nine life-support systems: Ozone depletion

- 18:00 24 February 2010 by **Fred Pearce**
- Magazine issue 2749.



The ozone hole was until recently a growing problem (Image: Rex Features)

Boundary: Average concentration of stratospheric ozone no lower than 276 Dobson units

Current level: 283 Dobson units

Diagnosis: Safe, and improving

The ozone hole that formed in the stratosphere over Antarctica in the 1970s was a classic example of an environmental tipping point. Ozone-destroying chemicals built up in the frigid stratosphere until they abruptly - and unexpectedly - caused the ozone layer over the Antarctic to shift into a new state, with ozone all but absent in the spring. Nobody saw it coming, as nobody understood at the time that the chemistry of polar stratospheric clouds makes ozone-destroying chemicals more potent, leading to runaway ozone destruction.

The world acted quickly to heal the hole. With most of the culprit chemicals now banned, the worst of the danger has passed.

It is not over entirely, however. One concern is global warming. Trapping more heat close to the Earth's surface leaves the stratosphere colder. This means that the Arctic stratosphere could get cold enough in coming years for the remaining ozone-eating chemicals in the atmosphere to open up an ozone hole over the northern continents.

Away from the poles we look safe, unless there is some unknown quirk of atmospheric chemistry waiting to trip us up. Rockström and Paul Crutzen of the Potsdam Institute for Climate Impact Research in Germany - who won his Nobel prize for ozone-layer chemistry - recommend preventing stratospheric ozone concentrations outside the polar regions from falling by more than 5 per cent, or below a global average of 276 Dobson units (a measurement of the density of stratospheric ozone). With the concentrations of ozone-eaters still falling, it seems likely that we will stay within this planetary boundary.

http://www.newscientist.com/article/dn18572-earths-nine-lifesupport-systems-ozone-depletion.html

Earth's nine life-support systems: Fresh water

- 18:00 24 February 2010 by **Fred Pearce**
- Magazine issue 2749.

Diverting waterways to death (Image: Kelly Cheng Travel Photography/Getty)

Boundary: No more than 4000 cubic kilometres of fresh water consumed per year

Current level: 2600 cubic kilometres per year

Diagnosis: Boundary will be approached by mid-century

Humans now control most of the world's rivers, damming and diverting many of them to death. Thanks to us, a quarter of the world's river systems no longer reach the ocean for at least part of the year. This is drying out swathes of the landscape, emptying wetlands and destroying fisheries.Excess water use threatens humans in three ways: shortage of drinking water, loss of irrigation for agriculture, and changes in climate. Over the past 50 years, dams on rivers in central Asia have dried up the Aral Sea. Without the influence of the sea on climate, the entire region has become hotter in summer, colder in winter and more arid all year.

We need to limit the consumption of river water to around 4000 cubic kilometres per year, but we have a way to go before we hit that limit Meanwhile, as rivers run dry, we are pumping out ever more of the underground reserves held in the pores of rocks, many of them fossil reserves that will never be replaced by the rains. And we are disrupting other parts of the hydrological cycle by draining wetlands and razing forests. Deforestation of the Amazon will reduce evaporation rates in the tropical Americas, potentially changing weather patterns in the northern hemisphere, including the Asian monsoon.

Rockström, who is a hydrologist, suggests that preventing regional water crises from disrupting our global life-support systems will require limiting the consumption of river water to around 4000 cubic kilometres per year. That is roughly one-third of the flow down accessible rivers, excluding remote untamed rivers in rainforests and the Arctic. We have a way to go before we hit that limit. Current use is about 2600 cubic kilometres. But the excess is "largely committed already" for irrigating the crops needed to feed the growing world population, says Rockström. To keep within the boundary while feeding the world, we might have to curb irrigation of non-food crops like cotton or biofuels.

http://www.newscientist.com/article/dn18573-earths-nine-lifesupport-systems-fresh-water.html

Earth's nine life-support systems: Biodiversity

- 18:00 24 February 2010 by **Fred Pearce**
- Magazine issue 2749.

Amphibians like this guy comprise just some of many species at risk from habitat loss, climate change, pollution and pesticides, introduced species, and over-collection for food and pets (Image: Jeff Pachoud/Getty)

Boundary: Annual species extinction rate no more than 10 per million per year

Current level: At least 100 per million per year

Diagnosis: Boundary far exceeded

Humans are driving species to extinction by ploughing up or paving over their habitats, by introducing alien species like rats and weeds, by poisoning them with pollution, by hunting them for food and, increasingly, by changing the climate. Individual species may not matter much on their own, but collectively they form ecosystems that provide a range of vital "ecosystem services", such as recycling waste, cleaning water, absorbing carbon and maintaining the chemistry of the oceans.

Although we know that high levels of biodiversity are essential to healthy ecosystems, it is not yet clear how much can be lost before ecosystems collapse, nor which species are the key players in a given ecosystem. So Rockström's team settled on crude extinction rates as the best "interim indicator" of the state of ecosystems. They put the current extinction rate at more than 100 extinctions per million species per year, and rising. That compares with a natural "background" extinction rate of around 0.3. Up to 30 per cent of all mammal, bird and amphibian species will be threatened with extinction this century.

This cannot go on safely. Current rates may even mirror those of the "big five" mass extinctions of the past half-billion years, including the meteorite strike that did for the dinosaurs. While the world carried on after those events, it was massively transformed. To avoid a repeat, they suggest a safe long-term annual extinction rate of no more than 10 per million species per year. By that measure, they say, "humanity has already entered deep into a danger zone... if the current extinction rate is sustained".

http://www.newscientist.com/article/dn18574-earths-nine-lifesupport-systems-biodiversity.html

Nitrogen and phosphorus cycles

- 18:00 24 February 2010 by **Fred Pearce**
- Magazine issue 2749.

Human use of fertiliser is messing with the natural flow of nitrogen (Image: View China Photo/Rex Features)

Boundary 1: No more than 35 million tonnes of nitrogen fixed from the atmosphere per year

Current level: 121 million tonnes per year

Diagnosis: Boundary far exceeded and effects worsening

Boundary 2: No more than 11 million tonnes of phosphorus to flow into the oceans per year

Current level: 9 million tonnes per year

Diagnosis: Boundary not yet exceeded

Nitrogen is an essential component of all living things, yet only a small amount of the planet's stock of nitrogen is in a form that living things can absorb. This is "fixed" out of the air by bacteria in a range of leguminous plants. But you can have too much of a good thing. So other microbes "denitrify" ecosystems, converting the element back into forms not available for living things. This is the nitrogen cycle.

Farmers have always interfered with the cycle, because nitrogen availability often limits the fertility of soils. They have boosted production by planting more leguminous crops, like clover.

Then, a century ago, the nitrogen cycle changed forever when Fritz Haber, a German chemist, invented an industrial process for fixing nitrogen from the atmosphere to make chemical fertiliser. Today, 80 million tonnes of nitrogen is fixed from the atmosphere in this way each year and poured onto the world's fields.

But farming inefficiencies mean that most of this nitrogen runs off the land into rivers and oceans. Much of the nitrogen that does get into crops is later excreted by humans into sewers. We further fix nitrogen by cultivating legumes and burning fossil fuels, timber and crops. Put all that together, and we fix around 121 million tonnes of nitrogen a year, far more than nature does - and nature cannot cope.

The excess nitrogen is acidifying soils, killing vulnerable species and saturating ecosystems so that they lose the ability to recycle the nitrogen back into the air. Meanwhile, some over-fertilised lakes and seas in heavily farmed regions fill with "blooms" of aquatic life which then die and decompose, sucking all the oxygen out of the water in the process. The legacy of such blooms is anoxic "dead zones". At the last count there were more than 400 such zones in the oceans, covering 250,000 square kilometres, including parts of the Gulf of Mexico, the Baltic Sea and waters between Japan and Korea.

Rockström tentatively sets the safe level for human additions to the nitrogen cycle at about 35 million tonnes a year, one-quarter of the current total. Reaching that figure while continuing to feed the world is, to say the least, a tough ask.

Phosphorus, also used as fertiliser, is potentially part of the same problem. Around 20 million tonnes of phosphorus is mined from rock deposits annually and about half of this ends up in the ocean - about eight times the natural influx - where it contributes to blooms and dead zones. Rockström's team estimates that we can add up to 11 million tonnes of phosphorus per year without serious repercussions.

http://www.newscientist.com/article/dn18575-earths-nine-lifesupport-systems-nitrogen-and-phosphorus-cycles.html

Land use

- 18:00 24 February 2010 by **Fred Pearce**
- Magazine issue 2749.

Land use is currently within safe limits but climate change is not (Image: Design Pics Inc/Rex Features)

Boundary: No more than 15 per cent of ice-free land to be used for crops

Current level: 12 per cent

Diagnosis: Boundary will be approached by mid-century

The spread of farming into natural ecosystems, especially tropical forests, continues apace. Half the world's tropical rainforests are gone and large areas of grasslands once open to wildlife are now fenced in for livestock ranching. According to Rockström, the expansion of agriculture is the major driver behind loss of ecosystem services and threatens to both exacerbate climate change and damage the freshwater cycle. Meanwhile, urban areas are spreading across more densely populated regions like east and south Asia, Europe and North America.

Rockström sets his land-use boundary at the conversion of no more than 15 per cent of global ice-free land to growing crops. But he says how safe that will prove depends a lot on how we use the land. Will biologically rich and hydrologically important ecosystems be protected? Will farms be allowed to empty rivers and fill the wider world with nitrogen? Will cities contain their pollution?

Currently we have converted around 12 per cent of ice-free land to farming - about 16 million square kilometres. The boundary will likely be reached in the next few decades. To avoid going beyond it will require, above all, concentrating farming more intensively in the most productive areas, while containing its wider impact.

http://www.newscientist.com/article/dn18576-earths-nine-lifesupport-systems-land-use.html

Climate change

- 18:00 24 February 2010 by **Fred Pearce**
- Magazine issue 2749.

Melting sea ice will cause further problems (Image: Ashley Cooper/SpecialistStock/SplashdownDirect/Rex Features)

Boundary: Atmospheric CO_2 concentration no higher than 350 parts per million

Pre-industrial level: 280 ppm

Current level: 387 ppm

Diagnosis: Boundary exceeded

This is the big one. Voluminous historical evidence shows that carbon dioxide in the atmosphere is the planet's main thermostat, and that raising CO_2 concentrations warms the planet. We have done that in spades by burning fossil fuels, raising atmospheric levels from a pre-industrial 280 parts per million to the current 387 ppm. Politicians still debate what a dangerous level might be, but Rockström's team, advised by James Hansen, director of NASA's Goddard Institute for Space Studies in New York, says we passed the danger threshold more than 20 years ago, when we exceeded 350 ppm.

Why choose 350 ppm? After all, we have passed that already, and we are still here. The answer is that we haven't yet experienced all the warming from that amount of CO_2, not by a long chalk.

Every degree of warming caused directly by CO_2 is amplified by feedback processes. Melting sea ice exposes dark ocean, which means that the planet absorbs more solar heat. Warmer temperatures increase evaporation and so raise atmospheric levels of water vapour, another potent greenhouse gas. These feedbacks are the basis for the IPCC's warning that a warming of 1 °C due to CO_2 will escalate to around 3 °C.

It may get even worse. Some climate scientists, notably Hansen, argue that there are other "slow feedbacks". For example, warming will eventually destabilise natural reserves of CO_2 and another greenhouse gas, methane, stored in soils and permafrost. If so, warming of 1 °C due to CO_2 could eventually escalate to 6 °C.

This is far too much to handle, says Rockström. To keep the big polar ice sheets largely intact and prevent massive flooding will require limiting warming to just 2 °C. The widely-accepted target to achieve that is 450 ppm, but if the slow feedbacks are correct we will have to pull CO_2 levels back under 350 ppm to reach that target.

The good news is that we may have a bit of time, because those long-term feedbacks will take a while to kick in fully. Probably.

http://www.newscientist.com/article/dn18577-earths-nine-lifesupport-systems-climate-change.html

Aerosol loading

- 18:00 24 February 2010 by **Fred Pearce**
- Magazine issue 2749.

Unnaturally heating and cooling the planet (Image: Mauri Rautkari/Rex Features)

Boundary: Not yet identified

Diagnosis: Unknown

Human activity churns up the earth, creating dust, while burning coal, dung, forests and crop waste fills the atmosphere with soot, sulphates and other particles. We have more than doubled the global concentration of these aerosols since pre-industrial times. That haze influences the climate and is a threat to human health, so "aerosol loading" should be considered a potential planetary boundary.

The impacts are highly variable, though. Some aerosols, like sulphates, reflect solar radiation, causing cooling. Others, like soot, absorb and re-radiate it, causing warming. The global balance of these heating and cooling effects is unclear.

Aerosols also affect the climate in other ways. For example, the near-permanent brown haze across southern and eastern Asia is a subject of intense research as it appears to influence both the timing and the positioning of the monsoon.

Meanwhile, aerosols reduce crop yields by falling on fields, and also clog up human lungs, contributing to millions of deaths from lung and heart disease.

The damage from aerosols can be great, but their highly variable impacts left Rockström's team unable to put a number on safe limits.

http://www.newscientist.com/article/dn18578-earths-nine-lifesupport-systems-aerosol-loading.html

Chemical pollution

- 18:00 24 February 2010 by **Fred Pearce**
- Magazine issue 2749.

DDT is now a controlled substance but many harmful chemicals aren't (Image: Loomis Dean/Time & Life/Getty)

Boundary: Not yet identified

Diagnosis: Unknown

There are approaching 100,000 different human-made chemical compounds in use around the world today, in millions of different products. Additional compounds are created as by-products of manufacturing.

Chemicals are mainly a worry because of their impact on the health of humans and wildlife. Among those of greatest concern are toxic heavy metals like lead, organic pollutants that accumulate in tissues, and radioactive compounds.

A handful of these are already controlled. For instance, the "dirty dozen" persistent organic pollutants - which include DDT, PCBs and dioxins - are controlled under the Stockholm Convention on Persistent Organic Compounds. But the impact of most others remains undiagnosed. And even apparently benign chemicals may combine to produce toxic effects greater than the sum of their individual effects.

One idea considered by Rockström's group is that autism and ADHD in children may result from the widespread exposure to low concentrations of cocktails of these chemicals in the environment, creating what they call "a silent pandemic of subtle neuro-developmental disorders in children, possibly on a global scale".

An all-encompassing "chemicals boundary" could be valuable. But, say the authors, it is too early to say how or where it should be set.

http://www.newscientist.com/article/dn18579-earths-nine-lifesupport-systems-chemical-pollution.html

Can we trust the IPCC on the big stuff?

- 24 February 2010 by **Fred Pearce**
- Magazine issue 2749.

Has the climate threat to Earth's biodiversity been underplayed? (Image: Tim Graham/Getty)

EVER since the Intergovernmental Panel on Climate Change's 2007 report on the impacts of climate change was discovered to contain a major error - that the Himalayan glaciers will be largely gone by 2035 - there has been a media feeding frenzy to find other mistakes. But it misses the point to focus on individual errors sprinkled through the report's 1000 or so pages (see "Digging devils from the details"). How solid are its headline findings?

The IPCC presented the second section of its 2007 report in April that year at a news conference in Brussels, Belgium. Its message was clear: climate change is happening now, and its impacts will be increasingly felt as more and more carbon dioxide is pumped into the atmosphere. The panel then forecast key impacts.

In this special investigation, *New Scientist* takes a closer look at these headline forecasts. Our aim is not to uncover a new scandal buried deep in the report. Rather, we explore how conclusions that the IPCC itself regards as key findings reached the top of the heap, and whether the science behind them stands up to scrutiny.

We focus on three key topics: the impact of climate change on water supplies, food, and biodiversity. The investigation reveals that the IPCC's broad conclusions were sound. Indeed, the stringent rules of the IPCC means the report sometimes understated the potential impacts of climate change - on biodiversity, for instance.

But our findings suggest there may have been problems with the way its conclusions were presented. It was too easy for some numbers mentioned in passing in academic papers to find their way into public presentations of IPCC reports without sufficiently rigorous assessment. Sections reviewing how different regions around the world would feel the impacts, in particular, may not have been subjected to the same close review as others.

The IPCC has shown rigour and attention to detail in many areas, but laxness elsewhere

One of the most dramatic forecasts of the report was that "20 to 30 per cent of plant and animal species assessed so far are likely to be at increased risk of extinction if increases in global average temperature exceed 1.5 - 2.5 °C" above current levels. This appears in several IPCC summaries and was headlined at the report's launch in Brussels.

The key source is a *Nature* paper by 19 authors headed by Chris Thomas, then at the University of Leeds, UK, published in 2004. The pioneering study modelled changes to the "climate envelope" in which species live. It found that such warming would leave 15 to 37 per cent of species "committed to extinction", doomed as their habitats disappeared (*Nature*, vol 427, p 145).

Early drafts of the IPCC's 2007 report include this study in a table of 57 related papers. Problematically, Thomas's study was the only one to claim global coverage - others focused on specific regions or taxa.

One of the IPCC's lead authors, Guy Midgley of the South African National Biodiversity Institute in Cape Town, says they wanted a major statement on biodiversity threats but knew the Thomas paper alone was not sufficient evidence. Nonetheless, "to be mute on this would have been a significant disservice to policy-makers".

So Midgley and his colleagues took the decision to reanalyse the other regional and taxa predictions to harmonise their methodology with Thomas's. This was complex, but the results broadly matched those of the Thomas paper. So the IPCC authors presented the "20 to 30 per cent" extinction to the final plenary meeting where the report was to be signed off. The resulting interrogation "was the most intimidating thing I have ever faced", says Midgley.

In the final text, Thomas's phrase "committed to extinction" was watered down to "at increased risk of extinction". Midgley says it "is not out of line with the Thomas et al estimate, but is far better supported".

Did it represent the state of science? The Thomas paper was controversial. Six months after publishing the paper, *Nature* ran three critical reviews of its methods. None of these are referenced in the IPCC report. Midgley says the IPCC's strict word-counts prevented a full discussion of the issues - an unfortunate situation for a major finding in a report charged with assessing science.

But when *New Scientist* contacted the authors of those critiques, none demurred from the IPCC finding. One, John Harte at the University of California, Berkeley, said most of his criticisms suggested that Thomas underestimated extinction rates. Far from the IPCC being guilty of exaggeration, he says, its caution may have led it to underplay the extinction holocaust awaiting the planet's biodiversity in the coming century.

Such caution is less evident in the process that led to the IPCC's statement on the impacts of drought in Africa. This was another headline statement at the report's Brussels presentation. It said that by the 2020s, "between 75 and 250 million people [in Africa] are projected to be exposed to an increase in water stress due to climate change".

The report attributes the source of this conclusion to a 2004 paper by Nigel Arnell, director of the Walker Institute for Climate System Research at the University of Reading, UK. Arnell's study, in *Global Environmental Change* (vol 14, p 31), used six models and 14 scenarios, each describing a possible future

with varying changes to the climate and human population, to predict how many people will have access to less water in 21 regions of the world.

The study found that an additional 74 to 239 million Africans would suffer from increased "water stress", depending on the different climate and population scenarios, with an average of about 152 million. The IPCC rounded this range to "75 to 250 million".

But its interpretation of Arnell's paper is questionable. The IPCC report ignores another table showing the number of people in different regions who will have access to more water under climate change. The total across African regions ranges between 11 and 175 million, with an average of 111 million. In Arnell's paper, the two tables were given equal prominence.

Arnell's study also warned at length about not taking the quantified projections too literally. The figures do not appear in his conclusion. Instead, it says the numbers can be used to compare the relative effects of different climate and population scenarios. The IPCC report and the publicity at its launch did not reflect Arnell's caution.

Africa undoubtedly faces testing times over water, but the apparent desire to find a quotable number for drought threats in Africa arguably led the IPCC to an unbalanced conclusion.

Water shortages matter most in poor countries because of their influence on food production. The IPCC's chapter on food concludes that while crop yields in higher latitudes will probably increase under modest warming, "at lower latitudes, crop productivity is projected to decrease for even small local temperature increases (1 °C to 2 °C)". It says rice yields will be "unchanged", but wheat and maize will decline.

These conclusions are based on 69 studies, covering a range of climate scenarios. The report also makes clear that if farmers adapt their methods to a changing climate, they may avoid many of the damaging effects.

This global assessment is thorough. But again, the section of the report that discusses crop forecasts for Africa is problematic. Its summary highlights the finding that "projected reductions in yield in some countries could be as much as 50 per cent by 2020". This captured public attention and has appeared in speeches by IPCC chairman Rajendra Pachauri. But does the dire conclusion reflect the science?

One newspaper recently revealed this claim's source to be a commissioned report that had not been peer-reviewed. That in itself is not sufficient grounds to dismiss it. Many commissioned reports have sound findings and this one was written by a known expert, Moroccan Ali Agoumi. IPCC authors insist that citing it was legitimate. The real issue is whether Agoumi's findings justify the IPCC's conclusion that some countries in Africa could lose half their food production by 2020. Our enquiries suggest not.

Agoumi's 11-page report, entitled "Vulnerability of North African Countries to Climatic Changes", was funded by the US Agency for International Development. It covers only three countries: Morocco, Tunisia and Algeria. It simply asserts, without identifying specific evidence or a peer-reviewed source, that "studies on the future of vital agriculture in the region" have identified a number of risks which are linked to climate change, including "deficient yields from rain-based agriculture of up to 50 per cent during the 2000-2020 period".

This is thin evidence, and the IPCC treated it carelessly. Agoumi said the projected losses were "linked" to climate change, rather than necessarily caused by it. The IPCC ignored this subtlety. Sometimes the IPCC said the decline in yield might happen due to natural variability in the climate as well as man-made climate change, and sometimes it didn't. IPCC sources this week admitted to *New Scientist* that this was an error.

Crucially, the IPCC ignored that Agoumi's prediction applies only to rain-fed agriculture. In arid North Africa much farming is irrigated rather than rain-fed. So the IPCC's prediction that some African nations could lose half of their crops is in fact based on a fraction of agriculture in three North African nations. The fact is we still know far too little about how African food production will be affected by climate change.

None of this alters the basic science. The findings of the parallel IPCC report on the physical science of climate change remain largely unchallenged. But some scientists involved say the demand from governments for detailed predictions about the effects of climate change within their own borders has led researchers to make predictions that do not stand up to scrutiny.

The IPCC is now laying the ground for its next report, to be published in 2014. The chair of the section on the impacts of climate change, Chris Field of the Carnegie Institution in Stanford, California, has inherited a tainted chalice. He told *New Scientist* there were flaws in the 2007 report, but that he is "committed to sufficient checking and cross-checking to ensure a truly error-free product next time".

Digging devils from the details

In recent weeks, many media reports have sought to pick holes in the details of the impact section of the IPCC's 2007 report. Co-chair of the section, Martin Parry of Imperial College London, last week sent a letter to fellow authors saying it was "a clamour without substance". Here's our potted guide.

Amazongate: The chapter on Latin America said that "up to 40 per cent of the Amazon forests could react drastically to even a slight reduction in precipitation". This was taken from a non-peer-reviewed report by environment group WWF, which had itself cited work by leading Amazon researcher Daniel Nepstad that did not support the statement. Subsequent work by Nepstad, however, does back this claim. "The IPCC statement on the Amazon was correct," he says.

Sea levels in the Netherlands: An observation that 55 per cent of the Netherlands "is below sea level" was wrong. The correct figure is 26 per cent (55 per cent is at risk of flooding). The faulty data was provided by the Dutch government, which acknowledged the error earlier this month. The mistake had no bearing on other statements.

Natural disasters: The IPCC linked worsening natural disasters to climate change. In particular, it published a graph apparently showing this link since 1970, and attributed the graph to an upcoming paper that did not ultimately include it. British risk-consultant Robert Muir-Wood, who produced the graph, told *New Scientist*: "It could be misinterpreted and should not have been included."

http://www.newscientist.com/article/mg20527493.700-can-we-trust-the-ipcc-on-the-big-stuff.html

Mathematicians offer tip-offs to LAPD

- 16:06 23 February 2010 by **Peter Aldhous**

Magazine issue 2749.

Catching a crime wave (Image: LHB Photo/Alamy)

Los Angeles police are getting tip-offs from unlikely informants: mathematicians.

Using crime data from southern California, Jeffrey Brantingham of the University of California, Los Angeles, and his colleagues set out to calculate how the movements of criminals and victims create opportunities for crime, and how police can reduce it. They came up with a pair of equations that could explain how local crime hotspots form – which turned out to be similar to those that describe molecular reactions and diffusion.

The equations suggested that there are two kinds of hotspot. The first, called "supercritical", arises when small spikes in crime pass a certain threshold and create a local crime wave. The second, "subcritical", happens when a particular factor – the presence of a drug den, for instance – causes a large spike in crime. The equations also indicated that rigorous policing could completely eliminate the subcritical hotspots, but would simply displace the supercritical variety.

The approach "presents a novel hypothesis of how hotspots form", says John Eck, a criminologist at the University of Cincinnati, Ohio. Brantingham hopes eventually to be able to predict where subcritical hotspots are forming, so police can step in to nip problems in the bud. His team is already collaborating with Los Angeles police.

Journal reference: *Proceedings of the National Academy of Sciences*, DOI: 10.1073/pnas.0910921107

http://www.newscientist.com/article/dn18560-mathematicians-offer-tipoffs-to-lapd.html

Cellphone traces reveal you're so predictable

- 15:05 19 February 2010 by **Phil McKenna**

We may all like to consider ourselves free spirits. But a study of the traces left by 50,000 cellphone users over three months has conclusively proved that the truth is otherwise."We are all in one way or another boring," says Albert-László Barabási at the Center for Complex Network Research at Northeastern University in Boston, who co-wrote the study. "Spontaneous individuals are largely absent from the population."Barabási and colleagues used three months' worth of data from a cellphone network to track the cellphone towers each person's phone connected to each hour of the day, revealing their approximate location. They conclude that regardless of whether a person typically remains close to home or roams far and wide, their movements are theoretically predictable as much as 93 per cent of the time.

Week in, week out

Surprisingly, the cellphone data showed that individuals' movements were more or less as predictable at weekends as on weekdays, suggesting that routine is rooted in human nature rather than being an effect of work patterns.The cellphone records were processed to identify the most visited locations for each user. Then the probability of finding a given user at his or her most visited locations at each hour through the day was calculated.People were to be found in their most visited location for any given hour 70 per cent of the time. Not surprisingly, the figure increased at night, and decreased at lunchtime and in the early evening, when most people were returning home from work.

History repeats

The team analysed the entropy, or randomness, of people's traces to show it was theoretically possible to predict the average person's whereabouts as much as 93 per cent of the time."Say your routine movement is from home to the coffee shop to work: if you are at home and then go to the coffee shop it's easy for me to predict that you are going to work," says co-author Nicholas Blumm.This predictability was not much affected by differences in age, gender, language spoken or whether a person lived in a rural or urban setting.

Evidence-based planning

More work analysing such data could make it possible to develop models that accurately predict movement as we predict the weather, says Alessandro Vespignani, director of the Center for Complex Networks and Systems Research at Indiana University in Bloomington, who was not involved in the study. However, he notes that mathematically proving that movement patterns are predictable is not the same as actually predicting them.Possible benefits include more efficient mass infrastructure, such as transportation and energy distribution networks. Some such networks are built on assumptions that people behave randomly: for example, the Erlang model used to estimate how many calls a telephone switch needs to handle assumes that calling patterns are completely random.

Basing the design of buildings or cities on evidence of how society behaves, not how their designers assume it does, could have significant effects, says Nathan Eagle of the Sante Fe Institute in New Mexico, although cities in developed nations with established planning strategies would probably gain only incrementally. "The biggest impact is going to be on the developing world; cities that don't already use traditional urban planning," he says.

Journal reference: *Science*, DOI: 10.1126/science.1177170

http://www.newscientist.com/article/dn18554-cellphone-traces-reveal-youre-so-predictable.html

Iran showing fastest scientific growth of any country

- 12:52 18 February 2010 by **Debora MacKenzie**

Hurray for our scientists (Image: Hasan Sarbakhshian/AP/Press Association Images)

It might be the Chinese year of the tiger, but scientifically, 2010 is looking like Iran's year.

Scientific output has grown 11 times faster in Iran than the world average, faster than any other country. A survey of the number of scientific publications listed in the Web of Science database shows that growth in the Middle East – mostly in Turkey and Iran – is nearly four times faster than the world average.

Science-Metrix, a data-analysis company in Montreal, Canada, has published a detailed report (PDF) on "geopolitical shifts in knowledge creation" since 1980. "Asia is catching up even more rapidly than previously thought, Europe is holding its position more than most would expect, and the Middle East is a region to watch," says the report's author, Eric Archambault.

World scientific output grew steadily, from 450,000 papers a year in 1980 to 1,500,000 in 2009. Asia as a whole surpassed North America last year.

Nuclear, nuclear, nuclear

Archambaut notes that Iran's publications have emphasised inorganic and nuclear chemistry, nuclear and particle physics and nuclear engineering. Publications in nuclear engineering grew 250 times faster than the world average – although medical and agricultural research also increased.

Science-Metrix also predicts that this year, China will publish as many peer-reviewed papers in natural sciences and engineering as the US. If current trends continue, by 2015 China will match the US across all disciplines – although the US may publish more in the life and social sciences until 2030.

China's prominence in world science is known to have been growing, but Science-Metrix has discovered that its output of peer-reviewed papers has been growing more than five times faster than that of the US.

Euro-puddings

Meanwhile, "European attitudes towards collaboration are bearing fruit", writes Archambaut. While Asia's growth in output was mirrored by North America's fall, Europe, which invests heavily in cross-

border scientific collaboration, held its own, and now produces over a third of the world's science, the largest regional share. Asia produces 29 per cent and North America 28 per cent.

Scientific output fell in the former Soviet Union after its collapse in 1991 and only began to recover in 2006. Latin America and the Caribbean together grew fastest of any region, although its share of world science is still small. Growth in Oceania, Europe and Africa has stayed at about the same rate over the past 30 years. Only North American scientific output has grown "considerably slower" than the world as a whole.

"The number of papers is a first-order metric that doesn't capture quality," admits Archambaut. There are measures for quality, such as the number of times papers are cited, and "Asian science does tend to be less cited overall".

But dismissing the Asian surge on this basis is risky, he feels. "In the 1960s, when Japanese cars started entering the US market, US manufacturers dismissed their advance based on their quality" – but then lost a massive market share to Japan. The important message, he says, is that "Asia is becoming the world leader in science, with North America progressively left behind".

http://www.newscientist.com/article/dn18546-iran-showing-fastest-scientific-growth-of-any-country.html

Drug laws are painful for cancer patients

- 11:46 24 February 2010 by **Ewen Callaway**

Unnecessary pain (Image: V. Ivleva/Focus/Rex Features)

Overzealous regulation of opioids is having a painful knock-on effect on eastern Europeans with cancer.

"There are literally tens of thousands of people who are suffering unnecessarily," says lead author Nathan Cherny of Shaare Zedek Medical Center in Jerusalem, Israel.

Opioid-type drugs are potent painkillers. In fact, the World Health Organization lists two of them, codeine and morphine, as "essential medicines" that should be available worldwide.

Cherny and his colleagues asked cancer pain specialists, including doctors, nurses and social workers from 40 European countries plus Israel, to review access to opioids in their countries.

They found that tens of thousands of cancer patients in several former Soviet bloc countries can't easily get the drugs because of laws aimed at preventing a black market in opioids. In Ukraine, for example, patients are only allowed a day's supply of medicine at a time, while in Georgia they must get a stamp from a police station to obtain painkillers.

Loosened restrictions

James Cleary at the Pain and Policy Studies Group in Madison, Wisconsin, is hopeful that laws will soon be relaxed in some eastern European countries.

Romania loosened restrictions on opioid painkillers in 2005 after doctors, pharmacists and patient advocates banded together to press the country's government for changes. Similar efforts are under way in Moldavia, Georgia, Armenia and other countries where access to opioids is restricted.Cherny's team found fewer restrictions on opioid painkillers in western Europe. But outside the US, Canada and Australia, the situation in the rest of the world is similar to eastern Europe's or worse, Cleary says. "Ten countries consume 80 per cent of the world's opioids."

Journal Reference: Annals of Oncology, DOI: 10.1093/annonc/mdp581

http://www.newscientist.com/article/dn18567-drug-laws-are-painful-for-cancer-patients.html

New weapons trained on blindness

- 23 February 2010 by **Claire Ainsworth**

Magazine issue 2748.

Second sight (Image: macroworld/iStock)

It starts with a barely perceptible blurring of vision from time to time - the sort of thing you might chalk up to getting older. But when you get it checked out, there is disturbing news: you have a disease called age-related macular degeneration, or AMD.

It can progress slowly or quickly, but there is no cure. Your hopes for an idyllic retirement - reading all those books, driving to new places, or just enjoying a carefree independence - are now clouded by uncertainty.

It's a depressing picture, and the odds are that one day it will happen to you or someone you know. People typically develop AMD after the age of 50, and it affects nearly 1 in 10 of those over the age of 80. It is the most common cause of blindness in the west.

That picture may be about to change, however. A decade ago an important insight into the biology of AMD led to an explosion of new strategies to treat it. And thanks to several anatomical peculiarities of the eye, it is an ideal testbed for therapies that would be riskier in other parts of the body.

As a result AMD has been the focus of several high-tech approaches, ranging from RNA interference to gene therapy and stem cells. Some of the most promising will soon be tested in people and could become established therapies in the next decade.

As its name suggests, AMD is a disease of the macula, a pea-sized patch in the centre of the retina. Its high acuity allows you to see fine detail, such as the letters on this page.

The retina has several layers (see diagram). Incoming light first reaches the photoreceptor cells, which turn it into electrical impulses. Underneath is a layer of supporting cells called the retinal pigmented epithelium, or RPE, which nourish the photoreceptors and clean up their waste. Below the RPE are the capillaries that form the retina's blood supply, but between blood and RPE is a thin layer called the blood-retinal barrier. Like the blood-brain barrier, this is only selectively permeable, keeping any toxins in the blood from reaching the delicate photoreceptors. It also helps to keep out the immune system and means that anything put into the eye is more likely to stay there.

The exact causes of AMD are still unclear, but the RPE cells appear to wither and die first. With their support system deteriorating, the photoreceptors die too. People retain their fuzzier peripheral vision, but as the disease progresses, their central vision goes and with it the ability to read, drive or even recognise facial expressions. "That is very isolating for people," says Barbara McLaughlan of the UK's Royal National Institute of Blind People. People with AMD in both eyes will typically become classed as legally blind between five and 10 years after the first symptoms appear.

For about 1 in 10 people with AMD, though, the disease suddenly progresses with terrifying speed. New blood vessels sprout under the retina, leaking blood and fluid. The macula swells and becomes scarred, and central vision can be lost in weeks. This form is known as wet AMD, while the slower version is the dry form.

For about 1 in 10 patients, the disease suddenly progresses with terrifying speed

Until recently people with AMD had few options. They are advised to avoid smoking and eat a diet rich in zinc, beta-carotene and vitamins C and E, but that can only slow things down. Various forms of eye surgery and laser or light therapies are used to treat wet AMD, but these are either risky or of limited help.

In the 1990s, however, studies of eye tissue taken at autopsy led to a key insight. The maculas of people with wet AMD had high levels of a signalling molecule called vascular endothelial growth factor (VEGF), which triggers the growth of new blood vessels.

Sight restored

The idea of blocking the action of this molecule has generated a host of treatment strategies. The most successful so far is an antibody fragment that binds to VEGF. Called Lucentis, it halts vision loss in about 95 per cent of people with wet AMD, and restores some sight in more than a third. "We had never seen anything like it," says Daniel Martin of the Cole Eye Institute in Cleveland, Ohio.

This approach is no panacea, though. For one thing the treatment must be injected into the eye every 4 to 6 weeks, and this occasionally triggers retinal detachment or an eye infection that can lead to blindness. It is also expensive: Lucentis, which is the only antibody-based drug approved to treat wet AMD, costs $2000 a shot, although some clinics provide a cheaper unlicensed alternative (see "Fight for sight").

Still, now that the principle of blocking VEGF has been established, various groups are working on improved therapies. The next treatment to reach the clinic might be VEGF Trap-Eye, a protein that binds to VEGF more tightly than Lucentis as well as mopping up another molecule involved in blood vessel growth - placental growth factor. Developer Regeneron says this might make it more potent, or require less frequent injections, perhaps every 8 weeks. The first results from large trials comparing VEGF Trap-Eye with Lucentis are due by the end of the year.

A completely different approach is to use RNA interference, a relatively new technique for switching off individual genes by delivering short stretches of RNA. So far the main hurdle has been getting RNA into the target cells, but the eye's accessibility means this is not so much of a problem. A few RNA-based drugs designed to block AMD are in the early stages of development.

The first to be tested in people was one called bevasiranib, though so far results have been poor. Other firms are looking beyond directly blocking VEGF, and are using RNA interference to target other molecules in its signalling pathway, either upstream or downstream. Merck and Pfizer have already bought rights to such agents, and each has a drug in early trials in people.

Like VEGF antibodies, though, RNA drugs would still entail regular eye injections. What's needed is a longer-lasting approach, which might come in the form of gene therapy.

The idea of permanently inserting new genes into cells has generated great hopes in the past few decades, but it is a risky path to tread. In 1999 US teenager Jesse Gelsinger died after a massive immune reaction against the virus used to deliver a gene. In 2002 a different virus triggered leukaemia in several children.

The eye might be a safer testing ground for gene therapies. It is enclosed by the blood-retina barrier, keeping viruses in and the immune system mostly out. Side effects should be limited to the eye, and in a worst-case scenario, the organ could be removed without endangering life. Researchers can peer inside for easy delivery of the therapy and to monitor progress, and the other, untreated eye is the perfect experimental control. There are also simple and safe ways to test the retina's functioning. Partly thanks to work in the eye, gene therapy is seeing something of a renaissance.

Proof of principle came in 2000 when a team led by Robin Ali at the Institute of Ophthalmology in London restored vision in mice with an inherited form of blindness. They delivered a gene with a virus called AAV - a different one to those that caused Gelsinger's death and the leukaemia cases.

Slowly and cautiously, Ali's group and others have been trying out an AAV-based gene therapy in people with an inherited form of blindness. There has been some vision improvement in most of the people who have received it so far. After just one treatment, benefits can persist for two years, according to Ali's latest, unpublished results. "This gave a huge boost to the field, because it showed it can be safe and effective," says Ali.

Work has now begun to find out whether gene therapy could provide a long-lasting treatment for AMD. US firm Genzyme has started recruiting for a trial involving a gene therapy designed to mop up VEGF. And this year, UK firm Oxford Biomedica plans to carry out trials in people of a therapy that delivers two other genes to block blood vessel growth.

All this is a long way from becoming an established therapy, however. In the meantime, faster progress may come via lower-tech drugs, with molecules small enough to diffuse through the tissues of the eye, so they could be given as eye drops. For example, a group of drugs called kinase inhibitors block the signals involved in blood vessel growth. Some are already used as cancer treatments and several are now in clinical trials for wet AMD, where they look promising.

Yet all these approaches have a major drawback. Because they work by blocking abnormal blood vessel growth, they would be no help for the 85 per cent of AMD patients who have the dry form of the disease.

Now, however, a possible treatment for dry AMD is on the horizon. Instead of tinkering with molecules or genes, the strategy is to entirely replace the problem RPE layer with a new one grown from stem cells.

Cell replacement

In theory stem cells offer the hope of growing new tissues to order, yet in reality, many challenges remain. At the moment human embryonic stem cells usually come from surplus IVF embryos. Tissues derived from these would be rejected unless the patient takes lifelong immunosuppressive drugs, as after an organ transplant. But again, the eye has a unique advantage. Because it is relatively shielded from the immune system, only low doses of immunosuppressants should be needed to prevent rejection.

One of the pioneering groups in this field is led by Pete Coffey at University College London. They have grown tiny sheets of RPE cells in the lab and have shown these can restore vision in rats and pigs. They hope to start the first trials in people early next year. "It could be an immense step," says Coffey. "No one has yet gone into the clinic with a human embryonic stem cell therapy."

US firm Pfizer has teamed up with Coffey, and has made RPE cells the main focus of its new regenerative medicine unit in Cambridge, UK. "We are trying to make the production of RPE more commercial," says Ruth Mackernon, chief scientific officer at the Cambridge unit.

US company ACT is also developing stem-cell RPE transplants, which have been successfully tested in animals. The company is now in talks with the Food and Drug Administration about trials in people with an inherited form of macular degeneration.

RPE transplants would only be helpful for people who still have some photoreceptors left to salvage, but one day even people beyond this stage may benefit. In 2006, Ali's team announced that they had taken photoreceptor cells from a young mouse and transplanted them into an adult mouse retina (*Nature*, vol 444, p 203). The team is now working on doing the same with human embryonic stem cells.

It is fair to say that in the next few years the eye will see a host of pioneering therapies. Hopefully they will mean more of us can look forward to that idyllic retirement after all.

Fight for sight

Why would a pharmaceutical company not encourage people to buy its drug? Could it be because it also sells an alternative at 40 times the price?

The two products are treatments for the "wet" form of age-related macular degeneration (AMD), which can rapidly lead to blindness (see main story). The expensive version - Lucentis - is about $2000 per injection, and patients may need a shot every 4 to 6 weeks. There is no question that it works well; in fact it is the first licensed drug that can reverse vision loss from this disease.

Before Lucentis was approved, however, ophthalmologists had started experimenting with a related drug, called Avastin, approved as an anti-cancer agent. Both are made by US firm Genentech.

The trouble started when Lucentis came to market, with its hefty price tag. Avastin, in contrast, costs about $50 a shot, because pharmacists divide up the large, cancer-treatment vials into small eye-sized doses. So more doctors began treating their AMD patients "off label" with Avastin.

Genentech issued statements warning that dividing vials of Avastin risked bacterial contamination, and cited other possible side effects. In 2007, the firm said it would block sales of Avastin to the pharmacies that were repackaging the drug for AMD, citing safety and regulatory concerns. "Genentech's decision was not motivated by a desire for increased profits," the company said in a statement.

After fierce opposition from patients, doctors and even the US Senate, however, the company relented. Both drugs are now used, often depending on patients' insurance coverage. What doctors and patients want to know is whether, as Genentech claims, Lucentis really is a better or safer drug for the eye than Avastin. But the company has steadfastly refused to run a comparison trial to find out. "We continue to believe Lucentis is the most appropriate treatment," the company told *New Scientist*.

The firm cannot, however, avoid publicly funded trials comparing the two drugs, and these are now under way in several countries. The first results from the US trial, which is the largest, should be out next year. Daniel Martin of the Cole Eye Institute in Cleveland, Ohio, who heads the US trial, says: "We have a responsibility to understand the difference between these two drugs and how to use them - period."

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http://www.newscientist.com/article/mg20527481.500-sight-savers-new-weapons-trained-on-blindness.html

Good vibrations aid mind-controlled steering

- 23 February 2010 by **Paul Marks**
- Magazine issue 2748.

The technology could make getting around easier for people with Lou Gehrig's disease (Image: Nick Laham/Getty)

IDENTIFYING telltale brain patterns promises to usher in a new era in which all manner of objects can be controlled by thought. But telling brain patterns apart is devilishly difficult. Now cybernetics researchers think a mild buzz from the gadgets that make phones vibrate will focus the mind.

Controlling electric wheelchairs using the power of the mind is emerging as a realistic option for some people with neurodegenerative conditions such as Lou Gehrig's disease. Several groups have already developed such thought-controlled wheelchairs, including Francisco Sepulveda's team at the University of Essex in Colchester, UK. His system involves wearing an electrode-filled skullcap connected to a PC running brain-computer interface (BCI) software. This can sense four types of thoughts, represented by electroencephalogram (EEG) potentials. The user thinks about their feet to move forwards, their tongue to stop, and their right or left hands to proceed in those directions.

But being able to move in only three directions is clearly very limiting. Sepulveda's team tried to improve on its design by building powerful artificial intelligence software to identify brain patterns associated with thinking about more complex directions, but success eluded them. "It would only get it right about 60 per cent of the time, which is not enough for the real world," says Sepulveda.

Now Anne-Marie Brouwer and colleagues at the TNO research organisation in Soesterberg, the Netherlands, believe they may have a more liberating approach. They have developed a system called tactile BCI, which uses a physical sensation to provoke an EEG potential called a P300. This is a specific brain response indicating a person's strong interest in a particular stimulus. It gets its name because the signal arises 300 milliseconds after the stimulus.

The researchers placed 12 phone vibrators, positioned like the numbers on a clock, on a belt worn around the wheelchair user's waist. These vibrate sequentially for 3 seconds each. If they wearer wants to go, say, in a 4 o'clock direction, they wait until the appropriate "tactor" vibrates and then think "that one". "That generates a P300 and selects the movement direction you want," says Brouwer.

If the user wants to go in a 4 o'clock direction, they wait for the right vibration and think 'that one'

Tests with 50 volunteers produced good results. "Almost everyone who tried it liked it," Brouwer says.

Tactile BCI could be an important advance, says Sepulveda. "I think Brouwer's work will be useful. It explores a whole new channel - a tactile stimulus instead of a visual or auditory one."

http://www.newscientist.com/article/mg20527485.600-good-vibrations-aid-mindcontrolled-steering.html

Memory-melting protein is key to fly forgetfulness

- 12:28 19 February 2010 by **Aria Pearson**

You may hate forgetting things, but healthy brains need to be able to overwrite old memories. Now a protein responsible for forgetting has been identified in flies, and it's been used to speed up and slow down the erasure of painful memories.

It is still unknown if the protein plays a similar role in people. But the finding is intriguing because the natural process of memory decay remains shrouded in mystery. "We know very, very little about what causes normal forgetting," says James McGaugh, a neurobiologist at the University of California, Irvine, who was not involved in the new work.

If the protein does play a similar role in humans, it could lead to new techniques for either enhancing or erasing memory. Until now approaches to erasing unwanted memories have largely focussed on interfering with the laying-down of memories, rather than our natural ability to forget.

Flies, forget

After learning that some humans with cognitive disabilities have mutations in genes that control the activity of a protein called Rac, Yi Zhong and his colleagues at Cold Spring Harbor Laboratory in New York reasoned that the protein might be involved in memory.

They tested this idea in fruit flies by using genetic engineering to enhance or repress the activity of Rac in the parts of the flies' brains associated with short-term memory. Then they measured how quickly the flies' memories seemed to disappear.

The flies were taught to associate a certain smell with an electric shock. Those with enhanced Rac activity forgot the association faster than normal flies, and those with suppressed activity retained the memory longer. "A memory that was supposed to disappear after a few hours lasted for more than 24 hours," says Zhong.

The researchers also investigated what happens to processes that would normally speed up forgetfulness, including new odour associations designed to either distract or conflict with the original odour associations. They found that lowered Rac activity also caused rats to hold on to their original memories longer when faced with these new associations.

Head eraser

If this mechanism holds true in mammals, it could shed light on the molecular basis of forgetting in humans.

To that end, Zhong is looking at Rac activity in people with schizophrenia, who also have unusually good memories. If their Rac activity is lower than in people with normal memory capability, this might suggest the protein's ability to melt memories away carries over into people.

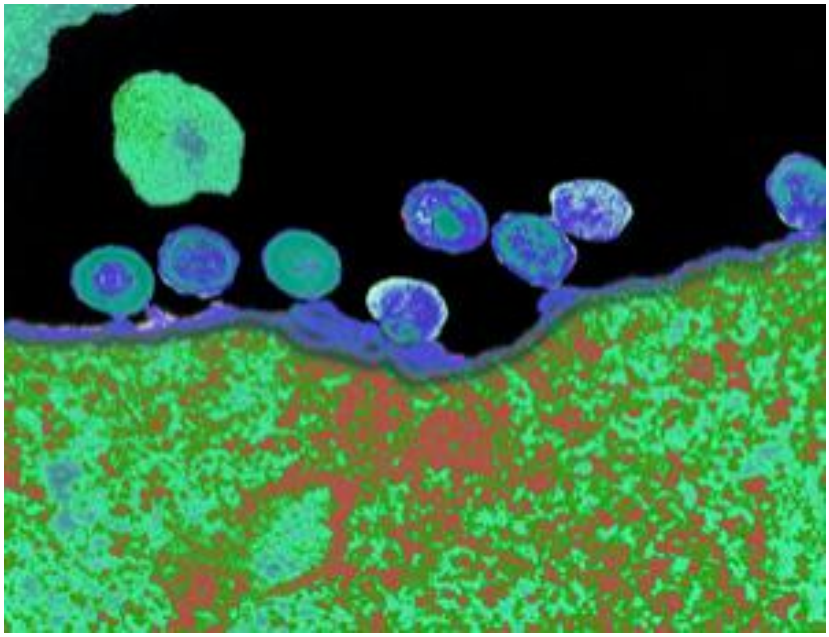
His team is also testing to see if Rac might influence the retention of long-term memories in flies. "We believe this forgetting mechanism might be universal, that it could erase any kind of memory," he says.

Journal reference: *Cell*, DOI: 10.1016/j.cell.2009.12.044

http://www.newscientist.com/article/dn18553-memorymelting-protein-is-key-to-fly-forgetfulness.html

Fight HIV with HIV: 'safe' virus proposed as vaccine

- 00:01 19 February 2010 by **Andy Coghlan**



HIV is the cure (Image: Voisin/Phanie/Rex Features)

A company is planning to inject people with an HIV vaccine made of the deadly virus itself, albeit a deactivated version.

Vaccines against many viruses, including flu, are made from deactivated versions of those viruses, but such an approach was previously dismissed as too risky in the case of HIV.

Now Virxsys of Gaithersburg, Maryland, is resurrecting the controversial approach, thanks to successful tests of a similar vaccine against SIV – also known as simian HIV – in monkeys.

"We said 'let's use HIV against itself', and that's what we're doing," says Gary McGarrity, Virxsys's vice president of scientific and clinical affairs.

High-profile flop

The idea of turning to the virus itself follows years of frustration with prospective vaccines based on viruses other than HIV, such as adenoviruses that cause colds.

Adenoviruses have been modified to carry parts of the HIV virus. Although there were hints of modest success with one such vaccine last year, the previous best bet proved to be a high-profile flop in 2007, during a trial dubbed "STEP".

Crucially, the new tests in monkeys suggest a vaccine based on HIV itself might be more effective than these attempts. The company is planning to apply for approval to perform human trials.

Virxsys says such trials would initially be only in people who already carry the virus, rather than in healthy people at risk of infection. This will certainly make for a less controversial trial, as it would avoid any chance of the vaccine going "live" and infecting people who didn't have HIV to start with.

Virus slashed

For now, though, the company's latest results, presented on Thursday at the 2010 annual Conference on Retroviruses and Opportunistic Infections in San Francisco, are limited to a vaccine based on a deactivated version of simian HIV called SIV.

Virxsys researchers described how they vaccinated monkeys, and then six months later injected them with SIV. Within weeks of receiving the injection of SIV, concentrations of the virus had fallen by at least 95 per cent in those treated.

After a year, when the trial ended, these concentrations remained low, whereas untreated monkeys became progressively sicker as their immune systems were depleted by the virus. "We expect them to die in the next few weeks," says McGarrity.

What's more, in vaccinated animals, concentrations of CD4+ cells – the immune cells that both HIV and SIV attack and kill - remained the same, suggesting their immune systems were able to withstand SIV infection.

"These results give us the green light to proceed," says Franck Lemiale of Virxsys, who led the two-year trial and presented the results. "We cannot be sure that this will work as well in humans, but this is the point of performing clinical trials.

Entry only

Virxsys is convinced that the HIV vaccine it is planning would be safe because, as in their SIV vaccine, all the genes that would usually make it infectious and able to multiply itself would be removed. "It can't replicate," says Lemiale.

All that would be left of the dozen or so genes that HIV normally has would be the three – called *gag*, *pol* and *rev* – that enable it to infiltrate cells and embed itself into their DNA. This means the vaccine's version of the virus only undergoes one cycle of protein production, which enables it to get inside a few cells, but then can't spread further.

The hope is that the vaccine version of HIV would invade sentinel cells, known as dendritic cells - as the SIV-based vaccine did in the monkeys. These would then prime the immune system's T-cells to attack the real virus, should it turn up in the body.

Dodge this

The monkey trials also suggested that a vaccine based on HIV itself might be more effective than previous vaccines based on cold viruses.

The "STEP" HIV-vaccine trial had to be halted prematurely in 2007 when it emerged that antibodies produced by the body against the vaccine may have provided HIV with more target cells to infect, speeding its spread.

But Virxsys's tests in monkeys revealed that the animals did not produce antibodies against the SIV-based vaccine itself. This suggests that an HIV-based vaccine might dodge the problems that dogged the STEP trial.

Potent mix?

Virxsys is not the first company to successfully test SIV-based vaccines in monkeys. A team led by David Evans of Harvard Medical School in Southborough, Massachusetts, reported successfully protecting monkeys a year ago with a similar "single-cycle" vaccine, this time containing all but one of the SIV genes, but he had no intention of transferring the work to people.

There is still the possibility, however, that in people that already have HIV, the vaccine version of the virus could recombine with the incumbent full-strength strain, and evolve into an even more potent adversary.

Evans thinks Virxsys has made this less likely by limiting the vaccine virus to a single cycle of infection. "That certainly makes it safer than a replication-competent live attenuated virus," he says.

http://www.newscientist.com/article/dn18551-fight-hiv-with-hiv-safe-virus-proposed-as-vaccine.html

Even in the virtual world, men judge women on looks

- 19 February 2010 by **Jessica Griggs**
- Magazine issue 2748.

Pleading for empathy (Image: Indianna University School of Informatics)

HOW is a female avatar supposed to get a fair treatment in the virtual world? They should rely on human females - men can't help but be swayed by looks.

Thanks to video games and blockbuster movies, people are increasingly engaging with avatars and robots. So Karl MacDorman of Indiana University in Indianapolis, Indiana, decided to find out how people treated avatars when faced with an ethical dilemma. Does an avatar's lack of humanity mean people fail to empathise with them? The answer seems to depend on gender.

He presented 682 volunteers with a dilemma modified from a medical ethics training programme. Playing the role of the doctor, they were faced with a female avatar, Kelly Gordon, pleading with them not to tell her husband at his next check-up that she had contracted genital herpes. The dilemma is intended to make medical students consider issues like doctor-patient confidentiality, not to produce a right or wrong answer, says MacDorman.

Gordon was presented to the volunteers in one of four different ways, either as an actress superimposed on a computer generated (CG) background or a CG female on the same background (pictured) - and then either edited to move smoothly or in a jerky, unnatural way.

Overall, women responded more sympathetically to Gordon, with 52 per cent acceding to her request compared with 45 per cent of men. But whereas women's attitudes were consistent however Gordon was presented, the male volunteers' attitudes swung sharply. The two human versions got a far more sympathetic hearing than their avatar counterparts. "Clearly, presentational factors influence people's decisions, including decisions of moral and ethical consequence," says MacDorman.

"The different response from volunteers could suggest men showed more empathy towards characters that they see as a potential mate," he says.

However, Jesse Fox, a human-computer interaction researcher at Stanford University in California, who has studied female characterisation in virtual environments, believes the less favourable attitude shown by men towards the CG Gordon may be explained by the fact that the avatar was more sexualised than the human one - with a bare midriff and fuller breasts. "Sexualised representations of women are often judged to be dishonest, or 'loose', and more so by men than by women. This could explain the finding, especially in a situation in which you're talking about sexually transmitted diseases," she says.

The study will be published in a forthcoming edition of the journal *Presence*.

http://www.newscientist.com/article/mg20527485.500-even-in-the-virtual-world-men-judge-women-on-looks.html

Innovation: Who wants ultra-fast broadband?

- 12:23 22 February 2010 by **Paul Marks**

10 times faster than South Korea, but who benefits? (Image: Kim Jae-Hwan/Getty)

Innovation is our regular column that highlights emerging technological ideas and where they may lead

Google recently announced it will attempt to provide a select group of US communities with internet access at an unprecedentedly high rate of 1 gigabit per second – between 100 and 1000 times greater than what's available in most countries. It's 10 times faster than homes receive in the online gaming haven of South Korea – where they plan to have gigabit delivery in 2012.

But although the Googlers are sure that such a speed boost is A Good Thing, even product managers Minnie Ingersoll and James Kelly admit they don't know what people will do with such capacity.

What suggestions they do have are a little uninspiring. Would users, they ask, stream 3D medical scans to distant doctors for second opinions? Or watch lectures in 3D while simultaneously collaborating with classmates? Meh. Doesn't sound much fun.

Higher than hi-def

Technology market research firm In-Stat – based in Scottsdale, Arizona, and owned by the same parent company as *New Scientist* – has some better clues in its latest report. That 3D TV is on the way is already clear, it says, but TV makers, public broadcasters such as Japan's NHK and Britain's BBC, plus some of the movie studios, are already thinking about ultra-high-definition TV (Ultra-HD). Standards bodies like the International Telecommunications Union and the Society of Motion Picture and Television Engineers are on the case, too.

Offering pictures with a resolution of 4000 lines compared with HD's roughly 1000-line images, the Ultra-HD format currently requires bandwidths of around 45 megabits per second to broadcast 2D images.

With TV on demand evidently here to stay, and 3D and gaming variants of Ultra-HD plausible too, it isn't hard to see how future gigabit fibre networks could be rapidly eaten up. Just like software always expands to fill the memory available, apps that eat gigabits will doubtless appear.

Your turn next

And yet these services are still theoretical. While right now having your broadband speed quadruple might change your life, having it increase hundredfold would probably just deliver more of the same, unless someone can make me a holodeck to use up the bandwidth. As the chief executive of the UK's largest broadband provider, BT, said last year – explaining why he didn't think optical fibre connections to the home are needed – "a Ferrari is faster than a Ford, but most people are happy with a Ford".

Rather than being aimed at consumers, Google's initiative is meant to push the telecoms firms that connect Google with its customers to raise the bar on the transmission technologies they invest in next. The US Federal Communications Commission is probably also a target, as it prepares to file its National Broadband Plan to boost the nation's broadband connectivity with Congress next month.

Critics point out that Google's experiment isn't economically realistic. It won't offer any of the other services a telecoms firm would use to subsidise the cost of investing in expensive new fibre, such as a landline telephone service and cable TV. Even so, Google says it will somehow manage to offer the gigabit service at "competitive prices".

Hornets' nest

It's reminiscent of the way Google barged into the mobile and wireless arena with ideas for major changes to the way we buy cellphones and airtime, similarly alienating the people it needs on its side.

That earned Google's CEO Eric Schmidt a hostile reception from cellphone executives at an event earlier this week.

These latest plans may put Google at risk from similar treatment from the broadband industry.

http://www.newscientist.com/article/dn18555-innovation-who-wants-ultrafast-broadband.html

Latex could silence noisy neighbours

- 22 February 2010 by **Colin Barras**
- Magazine issue 2748.

A cheap solution could be on the way (Image: Christopher Bissell/Getty)

THE rumbling bass from the party animals next door need no longer keep you awake at night. Cheap and effective soundproofing can be yours in the shape of novel tiles made from latex and a few plastic buttons.

Low-frequency sounds, especially, seem to seep through most domestic walls. That's because of their long wavelength, says Zhiyu Yang at the Hong Kong University of Science and Technology in Kowloon. Bass sounds at 100 hertz have a wavelength of over 3 metres in air, "and several times longer in solids", he says.

To block out all sound, buildings would need walls several metres thick. Now Yang and his team have developed soundproof panels made of latex and plastic buttons, that will do the job (*Applied Physics Letters*, DOI: 10.1063/1.3299007).

These noise-cancelling panels consist of a latex rubber membrane stretched over a 3-millimetre-thick rigid plastic grid of 1-centimetre-wide squares. In the middle of each square is a small, weighted, plastic button.

When sound waves hit the panel, the membrane and weighted buttons resonate at difference frequencies. "The inner part of the membrane vibrates in opposite phase to the outer region," says Yang. That means the sound waves cancel each other out and no sound gets through.

Each weighted membrane only cancels out sound waves within a small band of frequencies. But changing the weight of the buttons alters the operational frequency, says Yang. By stacking five membranes together, each tuned to a specific band, you can create a soundproof panel that works in the range from 70 to 550 hertz.

By stacking five membranes, each tuned to a specific band, you can create a soundproof panel

With these panels you can soundproof homes, says Yang. And the panel's weight is equivalent to ceramic bathroom tiles, "although it's slightly thicker at 15 millimetres", he adds.

The panels could be used "in noisy environments such as airports", says Xuanlai Fang at the University of Illinois in Urbana-Champaign. "If these metamaterials can be manufactured economically, the impact can be very significant."

http://www.newscientist.com/article/mg20527485.400-latex-could-silence-noisy-neighbours.html

For sustainable architecture, think bug

- 22 February 2010 by **Philip Ball**

Magazine issue 2748.

Fit for the environment (Image: Image Source/Rex Features)

IN THE heart of Africa's savannah lies a city that is a model of sustainable development. Its buttressed towers are built entirely from natural, biodegradable materials. Its inhabitants live and work in quarters that are air-conditioned and humidity-regulated, without consuming a single watt of electricity. Water comes from wells that dip deep into the earth, and food is cultivated self-sufficiently in gardens within its walls. This metropolis is not just eco-friendly: with its curved walls and graceful arches, it is rather beautiful too.

This is no human city, of course. It is a termite mound.

Unlike termites and other nest-building insects, we humans pay little attention to making buildings fit for their environments. "We can develop absurd architectural ideas without the punishment of natural selection," says architect Juhani Pallasmaa of the Helsinki University of Technology in Finland. As we wake up to climate change and resource depletion, though, interest in how insects manage their built environments is reawakening. It appears we have a lot to learn.

"The building mechanisms and the design principles that make the properties of insect nests possible aren't well understood," says Guy Théraulaz of the CNRS Research Centre on Animal Cognition in Toulouse, France. That's not for want of trying. Research into termite mounds kicked off in the 1960s, when Swiss entomologist Martin Lüscher made trailblazing studies of nests created by termites of the genus *Macrotermes* on the plains of southern Africa. It was he who suggested the chaotic-looking mounds were in fact exquisitely engineered eco-constructions.

Specifically, he proposed an intimate connection between how the mounds are built and what the termites eat. *Macrotermes* species live on cellulose, a constituent of plant matter that humans can't digest. In fact, neither can termites. They get round this by cultivating gardens of fungi that turn wood into digestible nutrients.

These fungus gardens must be well ventilated, and their temperature and humidity closely controlled - no mean feat in the tropical climates in which termites live. In Lüscher's picture, heat from the fungi's metabolism and the termites' bodies causes stagnant air laden with carbon dioxide to rise up a central chimney. From there it fans out through the porous walls of the mound, while new air is sucked in at the base.

Giant lungs

So simple and appealing was this idea that it spawned at least one artificial imitation: the Eastgate Centre in Harare, Zimbabwe, designed by architect Mick Pearce. Opened in 1996, it boasts a termite-inspired

ventilation and cooling system. Or at least it was thought to. It turns out, however, that few if any termite mounds work this way.

Keeping the temperature and humidity within termite mounds constant while at the same time getting rid of CO_2 demands a very efficient process of gas exchange. A typical mound with about 2 million inhabitants needs to "breathe" about 1000 litres of fresh air each day. To investigate further what might drive such an exchange, Scott Turner, a termite expert at The State University of New York in Syracuse, and Rupert Soar of Freeform Engineering in Nottingham, UK, looked into the design principles of *Macrotermes* mounds in Namibia. They found that the mounds' walls are warmer than the central nest, which rules out the kind of buoyant outward flow of CO_2-rich air proposed by Lüscher. Indeed, injecting a tracer gas into the mound showed little evidence of steady, convective air circulation.

Turner and Soar believe that termite mounds instead tap turbulence in the gusts of wind that hit them. A single breath of wind contains small eddies and currents that vary in speed and direction with different frequencies. The outer walls of the mounds are built to allow only eddies changing with low frequencies to penetrate deep within them. As the range of frequencies in the wind changes from gust to gust, the boundary between the stale air in the nest and the fresh air from outside moves about within the mounds' walls, allowing the two bodies of air to be exchanged. In essence, the mound functions as a giant lung.

This is very different to the way ventilation works in modern human buildings. Here, fresh air is blown in through vents to flush stale air out. Turner thinks there is something to be gleaned from the termites' approach. "We could turn the whole idea of the wall on its head," he says. We should not think of walls as barriers to stop the outside getting in, but rather design them as adaptive, porous interfaces that regulate the exchange of heat and air between the inside and outside. "Instead of opening a window to let fresh air in, it would be the wall that does it, but carefully filtered and managed the way termite mounds do it," he says.

Turner's ideas were among many discussed at a workshop on insect architecture organised by Théraulaz in Venice, Italy, last year. It aimed to pool understanding from a range of disciplines, from experts in insect behaviour to practising architects. "Some real points of contact began to emerge," says Turner. "There was a prevailing idea among the biologists that architects could learn much from us. I think the opposite is also true."

Absorbent sponges

One theme was just how proficient termites are at adapting their buildings to local conditions (see "More than one way to make a mound"). Termites in very hot climates, for example, embed their mounds deep in the vast heat sink of the soil - a hugely effective way of regulating temperature. Other species maintain humidity by depositing a slurry of chewed wood and grass at the base of the mound. This acts like a giant sponge, which, with a capacity of up to 80 litres, can supply or absorb water to counteract any humidity fluctuations within the nest. Such a trick could be mimicked using water tanks positioned in the bowels of a building to restore humidity in hot, dry climates. "As we come to understand more, it opens up a vast universe of new bio-inspired design principles," says Turner.

Tips might also be gleaned from the construction processes that insects employ. Some of the most thoroughly studied nest-building insects are the paper wasps, named after the fibrous material they use to make their combs. These consist of arrangements of tubular cells with hexagonal cross-sections, and while the designs are astonishingly diverse they are by no means random.

To find out how the combs are made, Théraulaz and his colleagues supplied different coloured paper to the wasps for each stage of nest building. This showed that the wasps observe general construction rules based on the configuration of neighbouring cells. "For example, they prefer to add cells to a corner area rather than starting a new row," Théraulaz says. No individual wasp has any idea what the final structure

will be, yet by following a simple set of rules - rules that evolution has determined maximise the insects' chances for survival - the constructions they arrive at are sound.

Termites ensure a similarly successful outcome using chemical signals called pheromones. As the nest-builders chew soil pellets into a cement-like paste, their saliva adds a chemical which, for just a few minutes, can be "smelled" by other builders over a distance of a centimetre or so. This sets up a positive feedback: the more a pillar is augmented, the stronger a pheromone source it becomes, causing the termites to add even more material.

Such approaches are anathema to human ideas of design and control, in which a central blueprint is laid down in advance by an architect and rigidly stuck to. But Turner thinks we could find ourselves adopting a more insect-like approach as technological advances make it feasible. "There's a huge opportunity for robotics to build systems of agents linked by a distributed intelligence that can remodel a building's structure as conditions change," he says. That might sound fanciful, but really it is just a return to the old human practices of organic building and settlement design, in which additions and alterations were made piecemeal over time in response to what went before.

Insect architecture might lead us back to old human practices of organic settlement design

Termites face many of the same challenges we do in our built environments, and meet them more efficiently, and sustainably. "A mound is in many ways as alive as the termites that build it," says Turner. Human buildings could soon come to life too.

More than one way to make a mound

Termites of the African species *Macrotermes bellicosus* have developed two very different strategies to optimise mound ventilation to local weather conditions. On the hot, dry savannahs of east and west Africa, their mounds are many-spired "cathedrals". According to biologist Judith Korb of the University of Osnabrück, Germany, this is one instance where heat gradients drive currents of air circulation that sink through the nest and rise in the walls during the day. This circulation gets more or less switched off at night when the temperature gradients disappear or reverse, avoiding heat loss and keeping the nest at a roughly constant temperature.

In the cooler forests of northern Ivory Coast, though, the same species builds simpler dome-shaped mounds in which buoyant warm air rises up through the nest and escapes through small holes in the walls. This design seems to trap more heat by limiting outward airflow, making sure that the fungus gardens that provide the termites' food are kept at an optimal temperature.

Thousands of miles away, another species of termite has developed an innovative way of making sure it gets the most out of the sun. The magnetic termite *Amitermes meridionalis* of Australia uses Earth's magnetic field to build mounds elongated in a north-south direction. The broad eastern and western faces soak up the weaker rays of the morning and evening sun, while a relatively narrow surface is subjected to the fierce glare of the midday sun - helping to keep the temperature relatively constant.

All termite mounds, Korb says, seem designed to produce homeostatic conditions in which the inner environment remains as constant as possible. The very different environments in which termites thrive show how successful they are.

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http://www.newscientist.com/article/mg20527481.300-for-sustainable-architecture-think-bug.html

Experts Offer Predictions Regarding Internet as of 2020

Google not a threat to intelligence, new apps will surprise, most agree

Lynn Blumenstein -- Library Journal, 2/23/2010

- One-third dissent over Internet as positive learning development
- Same percentage concerned over control access to information
- 41 percent think anonymity will be threatened

The Pew Internet Project has released the latest installment (the fourth since 2005) of its ongoing study of the Internet, as interpreted by prominent, multidiscipinary experts. The Future of the Internet IV offers survey results from nearly 900 "Internet stakeholders," a collection of business and technology leaders, consultants, and writers.

The experts offered opinions on five key education, technology, and privacy trends, as of 2020.

How will Google affect our intelligence?

Some 76 percent of respondents agreed with the statement that "Google won't make us stupid."

"Google allows us to be more creative in approaching problems and more integrative in our thinking. We spend less time trying to recall and more time generating solutions," said Paul Jones, ibiblio, University of North Carolina, Chapel Hill.

"The question is flawed: Google will make intelligence different," according to Alex Halavais, vice president, Association of Internet Researchers. "Holding in your head information that is easily discoverable on Google will no longer be a mark of intelligence.... Being able to quickly and effectively discover information and solve problems...will be the metric we use."

Does the Internet's intrusion on education efforts augment or disturb learning processes?

Two thirds, or 65 percent agreed with the statement, "the Internet has enhanced and improved reading, writing and the rendering of knowledge." According to Stephen Downes**,** National Research Council, Canada, by 2020 "a multi-literate society has developed, one that can communicate with ease through a variety of media, including art and photography, animation, video, games and simulations, as well as text and code."

But a significant minority is concerned over the changes already apparent. "We will be less patient and less able to concentrate on long-form texts. This will result in a resurgence of short-form texts and story-telling, in 'Haiku-culture' replacing 'book-culture," responded Andreas Kluth**,** writer, *Economist* magazine.

Can we predict what innovations are in the pipeline through 2020 or will we be surprised?

A resounding majority, 80 percent, agree that new applications will "come out of the blue," surprising and capturing the interest of Internet users. "The correct answer is a combination of the two," said David Clark, senior research scientist, Next-Generation Internet, MIT. The "device space" is foreseeable but the application space is harder to predict.

Will the "end-to-end" or the direct nature of information access continue or will there be more controlled access?

Only 61 percent thought the Internet will remain "as its founders envisioned" with a minimum of restrictions. One-third of the respondents agreed that "the Internet will mostly become a technology where intermediary institutions that control the architecture and …content will be successful in gaining the right to manage information and the method by which people access it."

Will Internet users be able to remain anonymous?

Some 55 percent agreed that Internet users will still be able to communicate anonymously, while 41 percent agreed that by 2020 "anonymous online activity is sharply curtailed."

http://www.libraryjournal.com/article/CA6720300.html?nid=2673&source=title&rid=18953123

Best Sellers in Computer Science

June 2009 to date as identified by YBP Library Services

-- Library Journal, 2/25/2010

1) Grace Hopper and the Invention of the Information Age
Beyer, Kurt W.
MIT Press
2009. ISBN 026201310X [9780262013109]. $27.95

2) Engineering Play: A Cultural History of Children's Software
Ito, Mizuko
MIT Press
2009. ISBN 0262013355 [9780262013352]. $24.95

3) The Myths of Security: What the Computer Security Industry Doesn't Want You To Know
Viega, John
O'Reilly Media
2009. ISBN 0596523025 [9780596523022]. $29.99

4) Beautiful Data
Segaran, Toby
O'Reilly Media
2009. ISBN 0596157118 [9780596157111]. $44.99

5) My Avatar, My Self: Identity in Video Role-Playing Games
Waggoner, Zach
McFarland
2009. ISBN 0786441097 [9780786441099]. $35

6) Computer and Information Security Handbook
Vacca, John R.
Morgan Kaufmann
2009. ISBN 0123743540 [9780123743541]. $119.99

7) Expressive Processing: Digital Fictions, Computer Games, and Software Studies
Wardrip-Fruin, Noah
MIT Press
2009. ISBN 0262013436 [9780262013437]. $34.95

8) Computing with Cells: Advances in Membrane Computing
Frisco, Pierluigi
Oxford University Press
2009. ISBN 0199542864 [9780199542864]. $99

9) Bio-Inspired and Nanoscale Integrated Computing
Eshaghian-Wilner, Mary Mehrnoosh
John Wiley
2009. ISBN 0470116595 [9780470116593]. $110

10) Handbook of Statistical Analysis and Data Mining Applications
Nisbet, Robert

Elsevier Academic Press
2009. ISBN 0123747651 [9780123747655]. $89.95

11) Ubiquitous Computing Fundamentals
Krumm, John
Chapman & Hall CRC
2010. ISBN 1420093606 [9781420093605]. $79.95

12) Handbook of Practical Logic and Automated Reasoning
Harrison, John
Cambridge University Press
2009. ISBN 0521899575 [9780521899574]. $135

13) High-Performance Heterogeneous Computing
Lastovetsky, Alexey
John Wiley
2009. ISBN 0470040394 [9780470040393]. $84.95

14) Text Mining: Classification, Clustering, and Applications
Srivastava, Ashok N.
Chapman & Hall CRC
2009. ISBN 1420059408 [9781420059403]. $79.95

15) Human-Centric Interfaces for Ambient Intelligence
Aghajan, Hamid
Elsevier Academic Press
2010. ISBN 0123747082 [9780123747082]. $130

16) Return to the Little Kingdom: Steve Jobs, the Creation of Apple, and How It Changed the World
Moritz, Michael
Overlook
2009. ISBN 1590202813 [9781590202814]. $27.95

17) Foundations of Computational Mathematics, Hong Kong 2008
Cucker, Felipe
Cambridge University Press
2009. ISBN 0521739705 [9780521739702]. $70

18) Developing Virtual Reality Applications: Foundations of Effective Design
Craig, Alan B.
Morgan Kaufmann
2009. ISBN 0123749433 [9780123749437]. $89.95

19) Brain-Mind Machinery: Brain-Inspired Computing and Mind Opening
Ng, Gee-Wah
World Scientific
2008. ISBN 981279025X [9789812790255]. $72

20) Game Engine Architecture
Gregory, Jason
A K Peters
2009. ISBN 1568814135 [9781568814131]. $65

http://www.libraryjournal.com/article/CA6720198.html?nid=2673&source=title&rid=18953123

Ten rules for writing fiction

Get an accountant, abstain from sex and similes, cut, rewrite, then cut and rewrite again – if all else fails, pray. Inspired by Elmore Leonard's 10 Rules of Writing, we asked authors for their personal dos and don'ts

Elmore Leonard, Diana Athill, Margaret Atwood, Roddy Doyle, Helen Dunmore, Geoff Dyer, Anne Enright, Richard Ford, Jonathan Franzen, Esther Freud, Neil Gaiman, David Hare, PD James, AL Kennedy

- guardian.co.uk, Saturday 20 February 2010 00.09 GMT

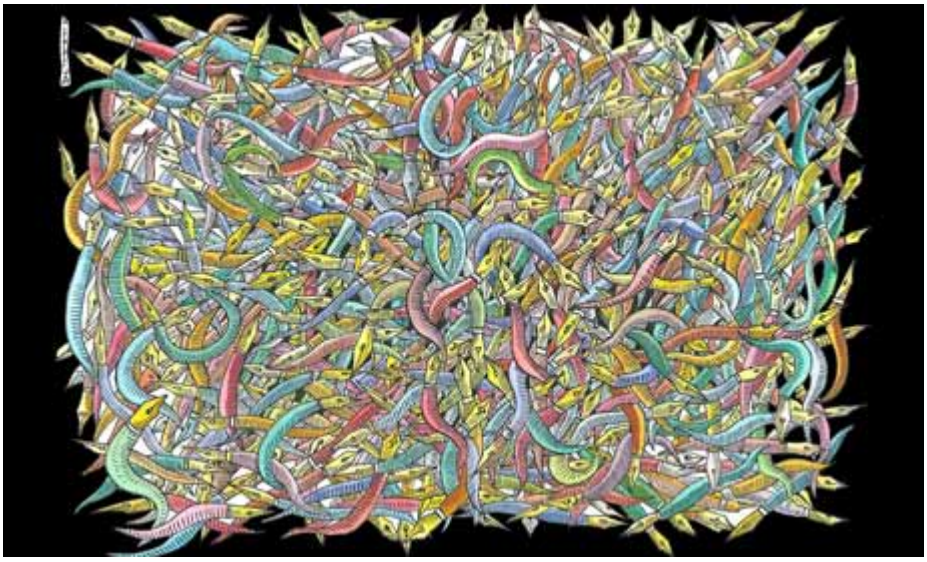


Illustration: Andrzej Krauze

Elmore Leonard: Using adverbs is a mortal sin

1 Never open a book with weather. If it's only to create atmosphere, and not a character's reaction to the weather, you don't want to go on too long. The reader is apt to leaf ahead looking for people. There are exceptions. If you happen to be Barry Lopez, who has more ways than an Eskimo to describe ice and snow in his book *Arctic Dreams*, you can do all the weather reporting you want.

2 Avoid prologues: they can be annoying, especially a prologue following an introduction that comes after a foreword. But these are ordinarily found in non-fiction. A prologue in a novel is backstory, and you can drop it in anywhere you want. There is a prologue in John Steinbeck's *Sweet Thursday*, but it's OK because a character in the book makes the point of what my rules are all about. He says: "I like a lot of talk in a book and I don't like to have nobody tell me what the guy that's talking looks like. I want to figure out what he looks like from the way he talks."

3 Never use a verb other than "said" to carry dialogue. The line of dialogue belongs to the character; the verb is the writer sticking his nose in. But "said" is far less intrusive than "grumbled", "gasped", "cautioned", "lied". I once noticed Mary McCarthy ending a line of dialogue with "she asseverated" and had to stop reading and go to the dictionary.

4 Never use an adverb to modify the verb "said" . . . he admonished gravely. To use an adverb this way (or almost any way) is a mortal sin. The writer is now exposing himself in earnest, using a

word that distracts and can interrupt the rhythm of the exchange. I have a character in one of my books tell how she used to write historical romances "full of rape and adverbs".

5 Keep your exclamation points under control. You are allowed no more than two or three per 100,000 words of prose. If you have the knack of playing with exclaimers the way Tom Wolfe does, you can throw them in by the handful.

6 Never use the words "suddenly" or "all hell broke loose". This rule doesn't require an explanation. I have noticed that writers who use "suddenly" tend to exercise less control in the application of exclamation points.

7 Use regional dialect, patois, sparingly. Once you start spelling words in dialogue phonetically and loading the page with apostrophes, you won't be able to stop. Notice the way Annie Proulx captures the flavour of Wyoming voices in her book of short stories *Close Range*.

8 Avoid detailed descriptions of characters, which Steinbeck covered. In Ernest Hemingway's "Hills Like White Elephants", what do the "American and the girl with him" look like? "She had taken off her hat and put it on the table." That's the only reference to a physical description in the story.

9 Don't go into great detail describing places and things, unless you're Margaret Atwood and can paint scenes with language. You don't want descriptions that bring the action, the flow of the story, to a standstill.

10 Try to leave out the part that readers tend to skip. Think of what you skip reading a novel: thick paragraphs of prose you can see have too many words in them.

My most important rule is one that sums up the 10: if it sounds like writing, I rewrite it.

Elmore Leonard's *10 Rules of Writing* is published next month by Weidenfeld & Nicolson.

Diana Athill

1 Read it aloud to yourself because that's the only way to be sure the rhythms of the sentences are OK (prose rhythms are too complex and subtle to be thought out – they can be got right only by ear).

2 Cut (perhaps that should be CUT): only by having *no* inessential words can every essential word be made to count.

3 You don't always have to go so far as to murder your darlings – those turns of phrase or images of which you felt extra proud when they appeared on the page – but go back and look at them with *a very beady eye*. Almost always it turns out that they'd be better dead. (Not every little twinge of satisfaction is suspect – it's the ones which amount to a sort of smug glee you must watch out for.)

Margaret Atwood

1 Take a pencil to write with on aeroplanes. Pens leak. But if the pencil breaks, you can't sharpen it on the plane, because you can't take knives with you. Therefore: take two pencils.

2 If both pencils break, you can do a rough sharpening job with a nail file of the metal or glass type.

3 Take something to write on. Paper is good. In a pinch, pieces of wood or your arm will do.

4 If you're using a computer, always safeguard new text with a memory stick.

5 Do back exercises. Pain is distracting.

6 Hold the reader's attention. (This is likely to work better if you can hold your own.) But you don't know who the reader is, so it's like shooting fish with a slingshot in the dark. What fascinates A will bore the pants off B.

7 You most likely need a thesaurus, a rudimentary grammar book, and a grip on reality. This latter means: there's no free lunch. Writing is work. It's also gambling. You don't get a pension plan. Other people can help you a bit, but essentially you're on your own. Nobody is making you do this: you chose it, so don't whine.

8 You can never read your own book with the innocent anticipation that comes with that first delicious page of a new book, because you wrote the thing. You've been backstage. You've seen how the rabbits were smuggled into the hat. Therefore ask a reading friend or two to look at it before you give it to anyone in the publishing business. This friend should not be someone with whom you have a romantic relationship, unless you want to break up.

9 Don't sit down in the middle of the woods. If you're lost in the plot or blocked, retrace your steps to where you went wrong. Then take the other road. And/or change the person. Change the tense. Change the opening page.

10 Prayer might work. Or reading something else. Or a constant visualisation of the holy grail that is the finished, published version of your resplendent book.

Roddy Doyle

1 Do not place a photograph of your favourite author on your desk, especially if the author is one of the famous ones who committed suicide.

2 Do be kind to yourself. Fill pages as quickly as possible; double space, or write on every second line. Regard every new page as a small triumph –

3 Until you get to Page 50. Then calm down, and start worrying about the quality. Do feel anxiety – it's the job.

4 Do give the work a name as quickly as possible. Own it, and see it. Dickens knew *Bleak House* was going to be called *Bleak House* before he started writing it. The rest must have been easy.

5 Do restrict your browsing to a few websites a day. Don't go near the online bookies – unless it's research.

6 Do keep a thesaurus, but in the shed at the back of the garden or behind the fridge, somewhere that demands travel or effort. Chances are the words that come into your head will do fine, eg "horse", "ran", "said".

7 Do, occasionally, give in to temptation. Wash the kitchen floor, hang out the washing. It's research.

8 Do change your mind. Good ideas are often murdered by better ones. I was working on a novel about a band called the Partitions. Then I decided to call them the Commitments.

9 Do not search amazon.co.uk for the book you haven't written yet.

10 Do spend a few minutes a day working on the cover biog – "He divides his time between Kabul and Tierra del Fuego." But then get back to work.

Helen Dunmore

1 Finish the day's writing when you still want to continue.

2 Listen to what you have written. A dud rhythm in a passage of dialogue may show that you don't yet understand the characters well enough to write in their voices.

3 Read Keats's letters.

4 Reread, rewrite, reread, rewrite. If it still doesn't work, throw it away. It's a nice feeling, and you don't want to be cluttered with the corpses of poems and stories which have everything in them except the life they need.

5 Learn poems by heart.

6 Join professional organisations which advance the collective rights of authors.

7 A problem with a piece of writing often clarifies itself if you go for a long walk.

8 If you fear that taking care of your children and household will damage your writing, think of JG Ballard.

9 Don't worry about posterity – as Larkin (no sentimentalist) observed "What will survive of us is love".

Geoff Dyer

1 Never worry about the commercial possibilities of a project. That stuff is for agents and editors to fret over – or not. Conversation with my American publisher. Me: "I'm writing a book so boring, of such limited commercial appeal, that if you publish it, it will probably cost you your job." Publisher: "That's exactly what makes me want to stay in my job."

2 Don't write in public places. In the early 1990s I went to live in Paris. The usual writerly reasons: back then, if you were caught writing in a pub in England, you could get your head kicked in, whereas in Paris, *dans les cafés* . . . Since then I've developed an aversion to writing in public. I now think it should be done only in private, like any other lavatorial activity.

3 Don't be one of those writers who sentence themselves to a lifetime of sucking up to Nabokov.

4 If you use a computer, constantly refine and expand your autocorrect settings. The only reason I stay loyal to my piece-of-shit computer is that I have invested so much ingenuity into building one of the great autocorrect files in literary history. Perfectly formed and spelt words emerge from a few brief keystrokes: "Niet" becomes "Nietzsche", "phoy" becomes "photography" and so on. Genius!

5 Keep a diary. The biggest regret of my writing life is that I have never kept a journal or a diary.

6 Have regrets. They are fuel. On the page they flare into desire.

7 Have more than one idea on the go at any one time. If it's a choice between writing a book and doing nothing I will always choose the latter. It's only if I have an idea for two books that I choose one rather than the other. I always have to feel that I'm bunking off from *something*.

8 Beware of clichés. Not just the clichés that Martin Amis is at war with. There are clichés of response as well as expression. There are clichés of observation and of thought – even of conception. Many novels, even quite a few adequately written ones, are clichés of *form* which conform to clichés of expectation.

9 Do it every day. Make a habit of putting your observations into words and gradually this will become instinct. This is the most important rule of all and, naturally, I don't follow it.

10 Never ride a bike with the brakes on. If something is proving too difficult, give up and do something else. Try to live without resort to perseverance. But writing is all about perseverance. You've got to stick at it. In my 30s I used to go to the gym even though I hated it. The purpose of going to the gym was to postpone the day when I would stop going. That's what writing is to me: a way of postponing the day when I won't do it any more, the day when I will sink into a depression so profound it will be indistinguishable from perfect bliss.

Anne Enright

1 The first 12 years are the worst.

2 The way to write a book is to actually *write* a book. A pen is useful, typing is also good. Keep putting words on the page.

3 Only bad writers think that their work is really good.

4 Description is hard. Remember that all description is an opinion about the world. Find a place to stand.

5 Write whatever way you like. Fiction is made of words on a page; reality is made of something else. It doesn't matter how "real" your story is, or how "made up": what matters is its necessity.

6 Try to be accurate about stuff.

7 Imagine that you are dying. If you had a terminal disease would you finish this book? Why not? The thing that annoys this 10-weeks-to-live self is the thing that is wrong with the book. So change it. Stop arguing with yourself. Change it. See? Easy. And no one had to die.

8 You can also do all that with whiskey.

9 Have fun.

10 Remember, if you sit at your desk for 15 or 20 years, every day, not counting weekends, it changes you. It just does. It may not improve your temper, but it fixes something else. It makes you more free.

Richard Ford

1 Marry somebody you love and who thinks you being a writer's a good idea.

2 Don't have children.

3 Don't read your reviews.

4 Don't write reviews. (Your judgment's always tainted.)

5 Don't have arguments with your wife in the morning, or late at night.

6 Don't drink and write at the same time.

7 Don't write letters to the editor. (No one cares.)

8 Don't wish ill on your colleagues.

9 Try to think of others' good luck as encouragement to yourself.

10 Don't take any shit if you can possibly help it.

Jonathan Franzen

1 The reader is a friend, not an adversary, not a spectator.

2 Fiction that isn't an author's personal adventure into the frightening or the unknown isn't worth writing for anything but money.

3 Never use the word "then" as a conjunction – we have "and" for this purpose. Substituting "then" is the lazy or tone-deaf writer's non-solution to the problem of too many "ands" on the page.

4 Write in the third person unless a really distinctive first-person voice offers itself irresistibly.

5 When information becomes free and universally accessible, voluminous research for a novel is devalued along with it.

6 The most purely autobiographical fiction requires pure invention. Nobody ever wrote a more auto-biographical story than "The Metamorphosis".

7 You see more sitting still than chasing after.

8 It's doubtful that anyone with an internet connection at his workplace is writing good fiction.

9 Interesting verbs are seldom very interesting.

10 You have to love before you can be relentless.

Esther Freud

1 Cut out the metaphors and similes. In my first book I promised myself I wouldn't use any and I slipped up during a sunset in chapter 11. I still blush when I come across it.

2 A story needs rhythm. Read it aloud to yourself. If it doesn't spin a bit of magic, it's missing something.

3 Editing is everything. Cut until you can cut no more. What is left often springs into life.

4 Find your best time of the day for writing and write. Don't let anything else interfere. Afterwards it won't matter to you that the kitchen is a mess.

5 Don't wait for inspiration. Discipline is the key.

6 Trust your reader. Not everything needs to be explained. If you really know something, and breathe life into it, they'll know it too.

7 Never forget, even your own rules are there to be broken.

Neil Gaiman

1 Write.

2 Put one word after another. Find the right word, put it down.

3 Finish what you're writing. Whatever you have to do to finish it, finish it.

4 Put it aside. Read it pretending you've never read it before. Show it to friends whose opinion you respect and who like the kind of thing that this is.

5 Remember: when people tell you something's wrong or doesn't work for them, they are almost always right. When they tell you exactly what they think is wrong and how to fix it, they are almost always wrong.

6 Fix it. Remember that, sooner or later, before it ever reaches perfection, you will have to let it go and move on and start to write the next thing. Perfection is like chasing the horizon. Keep moving.

7 Laugh at your own jokes.

8 The main rule of writing is that if you do it with enough assurance and confidence, you're allowed to do whatever you like. (That may be a rule for life as well as for writing. But it's definitely true for writing.) So write your story as it needs to be written. Write it honestly, and tell it as best you can. I'm not sure that there are any other rules. Not ones that matter.

David Hare

1 Write only when you have something to say.

2 Never take advice from anyone with no investment in the outcome.

3 Style is the art of getting yourself out of the way, not putting yourself in it.

4 If nobody will put your play on, put it on yourself.

5 Jokes are like hands and feet for a painter. They may not be what you want to end up doing but you have to master them in the meanwhile.

6 Theatre primarily belongs to the young.

7 No one has ever achieved consistency as a screenwriter.

8 Never go to a TV personality festival masquerading as a literary festival.

9 Never complain of being misunderstood. You can choose to be understood, or you can choose not to.

10 The two most depressing words in the English language are "literary fiction".

PD James

1 Increase your word power. Words are the raw material of our craft. The greater your vocabulary the more effective your writing. We who write in English are fortunate to have the richest and most versatile language in the world. Respect it.

2 Read widely and with discrimination. Bad writing is contagious.

3 Don't just plan to write – write. It is only by writing, not dreaming about it, that we develop our own style.

4 Write what you need to write, not what is currently popular or what you think will sell.

5 Open your mind to new experiences, particularly to the study of other people. Nothing that happens to a writer – however happy, however tragic – is ever wasted.

AL Kennedy

1 Have humility. Older/more experienced/more convincing writers may offer rules and varieties of advice. Consider what they say. However, don't automatically give them charge of your brain, or anything else – they might be bitter, twisted, burned-out, manipulative, or just not very like you.

2 Have more humility. Remember you don't know the limits of your own abilities. Successful or not, if you keep pushing beyond yourself, you will enrich your own life – and maybe even please a few strangers.

3 Defend others. You can, of course, steal stories and attributes from family and friends, fill in filecards after lovemaking and so forth. It might be better to celebrate those you love – and love itself – by writing in such a way that everyone keeps their privacy and dignity intact.

4 Defend your work. Organisations, institutions and individuals will often think they know best about your work – especially if they are paying you. When you genuinely believe their decisions would damage your work – walk away. Run away. The money doesn't matter that much.

5 Defend yourself. Find out what keeps you happy, motivated and creative.

6 Write. No amount of self-inflicted misery, altered states, black pullovers or being publicly obnoxious will ever add up to your being a writer. Writers write. On you go.

7 Read. As much as you can. As deeply and widely and nourishingly and irritatingly as you can. And the good things will make you remember them, so you won't need to take notes.

8 Be without fear. This is impossible, but let the small fears drive your rewriting and set aside the large ones until they behave – then use them, maybe even write them. Too much fear and all you'll get is silence.

9 Remember you love writing. It wouldn't be worth it if you didn't. If the love fades, do what you need to and get it back.

10 Remember writing doesn't love you. It doesn't care. Nevertheless, it can behave with remarkable generosity. Speak well of it, encourage others, pass it on.

Hilary Mantel

1 Are you serious about this? Then get an accountant.

2 Read *Becoming a Writer*, by Dorothea Brande. Then do what it says, including the tasks you think are impossible. You will particularly hate the advice to write first thing in the morning, but if you can manage it, it might well be the best thing you ever do for yourself. This book is about becoming a writer from the inside out. Many later advice manuals derive from it. You don't really need any others, though if you want to boost your confidence, "how to" books seldom do any harm. You can kick-start a whole book with some little writing exercise.

3 Write a book you'd like to read. If you wouldn't read it, why would anybody else? Don't write for a perceived audience or market. It may well have vanished by the time your book's ready.

4 If you have a good story idea, don't assume it must form a prose narrative. It may work better as a play, a screenplay or a poem. Be flexible.

5 Be aware that anything that appears before "Chapter One" may be skipped. Don't put your vital clue there.

6 First paragraphs can often be struck out. Are you performing a *haka*, or just shuffling your feet?

7 Concentrate your narrative energy on the point of change. This is especially important for historical fiction. When your character is new to a place, or things alter around them, that's the point to step back and fill in the details of their world. People don't notice their everyday surroundings and daily routine, so when writers describe them it can sound as if they're trying too hard to instruct the reader.

8 Description must work for its place. It can't be simply ornamental. It usually works best if it has a human element; it is more effective if it comes from an implied viewpoint, rather than from the eye of God. If description is coloured by the viewpoint of the character who is doing the noticing, it becomes, in effect, part of character definition and part of the action.

9 If you get stuck, get away from your desk. Take a walk, take a bath, go to sleep, make a pie, draw, listen to music, meditate, exercise; whatever you do, don't just stick there scowling at the problem. But don't make telephone calls or go to a party; if you do, other people's words will pour in where your lost words should be. Open a gap for them, create a space. Be patient.

10 Be ready for anything. Each new story has different demands and may throw up reasons to break these and all other rules. Except number one: you can't give your soul to literature if you're thinking about income tax.

Michael Moorcock

1 My first rule was given to me by TH White, author of *The Sword in the Stone* and other Arthurian fantasies and was: Read. Read everything you can lay hands on. I always advise people who want to write a fantasy or science fiction or romance to stop reading everything in those genres and start reading everything else from Bunyan to Byatt.

2 Find an author you admire (mine was Conrad) and copy their plots and characters in order to tell your own story, just as people learn to draw and paint by copying the masters.

3 Introduce your main characters and themes in the first third of your novel.

4 If you are writing a plot-driven genre novel make sure all your major themes/plot elements are introduced in the first third, which you can call the *introduction*.

5 Develop your themes and characters in your second third, the *development*.

6 Resolve your themes, mysteries and so on in the final third, the *resolution*.

7 For a good melodrama study the famous "Lester Dent master plot formula" which you can find online. It was written to show how to write a short story for the pulps, but can be adapted successfully for most stories of any length or genre.

8 If possible have something going on while you have your characters delivering exposition or philosophising. This helps retain dramatic tension.

9 Carrot and stick – have protagonists pursued (by an obsession or a villain) and pursuing (idea, object, person, mystery).

10 Ignore all proferred rules and create your own, suitable for what you want to say.

Michael Morpurgo

1 The prerequisite for me is to keep my well of ideas full. This means living as full and varied a life as possible, to have my antennae out all the time.

2 Ted Hughes gave me this advice and it works wonders: record moments, fleeting impressions, overheard dialogue, your own sadnesses and bewilderments and joys.

3 A notion for a story is for me a confluence of real events, historical perhaps, or from my own memory to create an exciting fusion.

4 It is the gestation time which counts.

5 Once the skeleton of the story is ready I begin talking about it, mostly to Clare, my wife, sounding her out.

6 By the time I sit down and face the blank page I am raring to go. I tell it as if I'm talking to my best friend or one of my grandchildren.

7 Once a chapter is scribbled down rough – I write very small so I don't have to turn the page and face the next empty one – Clare puts it on the word processor, prints it out, sometimes with her own comments added.

8 When I'm deep inside a story, living it as I write, I honestly don't know what will happen. I try not to dictate it, not to play God.

9 Once the book is finished in its first draft, I read it out loud to myself. How it sounds is hugely important.

10 With all editing, no matter how sensitive – and I've been very lucky here – I react sulkily at first, but then I settle down and get on with it, and a year later I have my book in my hand.

Andrew Motion

1 Decide when in the day (or night) it best suits you to write, and organise your life accordingly.

2 Think with your senses as well as your brain.

3 Honour the miraculousness of the ordinary.

4 Lock different characters/elements in a room and tell them to get on.

5 Remember there is no such thing as nonsense.

6 Bear in mind Wilde's dictum that "only mediocrities develop" – and challenge it.

7 Let your work stand before deciding whether or not to serve.

8 Think big and stay particular.

9 Write for tomorrow, not for today.

10 Work hard.

Joyce Carol Oates

1 Don't try to anticipate an "ideal reader" – there may be one, but he/she is reading someone else.

2 Don't try to anticipate an "ideal reader" – except for yourself perhaps, sometime in the future.

3 Be your own editor/critic. Sympathetic but merciless!

4 Unless you are writing something very avant-garde – all gnarled, snarled and "obscure" – be alert for possibilities of paragraphing.

5 Unless you are writing something very post-modernist – self-conscious, self-reflexive and "provocative" – be alert for possibilities of using plain familiar words in place of polysyllabic "big" words.

6 Keep in mind Oscar Wilde: "A little sincerity is a dangerous thing, and a great deal of it is absolutely fatal."

7 Keep a light, hopeful heart. But expect the worst.

Annie Proulx

1 Proceed slowly and take care.

2 To ensure that you proceed slowly, write by hand.

3 Write slowly and by hand only about subjects that interest you.

4 Develop craftsmanship through years of wide reading.

5 Rewrite and edit until you achieve the most felicitous phrase/sentence/paragraph/page/story/chapter.

Philip Pullman

My main rule is to say no to things like this, which tempt me away from my proper work.

Ian Rankin

1 Read lots.

2 Write lots.

3 Learn to be self-critical.

4 Learn what criticism to accept.

5 Be persistent.

6 Have a story worth telling.

7 Don't give up.

8 Know the market.

9 Get lucky.

10 Stay lucky.

Will Self

1 Don't look back until you've written an entire draft, just begin each day from the last sentence you wrote the preceeding day. This prevents those cringing feelings, and means that you have a substantial body of work before you get down to the real work which is all in . . .

2 The edit.

3 Always carry a notebook. And I mean *always*. The short-term memory only retains information for three minutes; unless it is committed to paper you can lose an idea for ever.

4 Stop reading fiction – it's all lies anyway, and it doesn't have anything to tell you that you don't know already (assuming, that is, you've read a great deal of fiction in the past; if you haven't you have no business whatsoever being a writer of fiction).

5 You know that sickening feeling of inadequacy and over-exposure you feel when you look upon your own empurpled prose? Relax into the awareness that this ghastly sensation will never, ever leave you, no matter how successful and publicly lauded you become. It is intrinsic to the real business of writing and should be cherished.

6 Live life and write about life. Of the making of many books there is indeed no end, but there are more than enough books about books.

7 By the same token remember how much time people spend watching TV. If you're writing a novel with a contemporary setting there need to be long passages where nothing happens save for TV watching: "Later, George watched *Grand Designs* while eating HobNobs. Later still he watched the shopping channel for a while . . ."

8 The writing life is essentially one of solitary confinement – if you can't deal with this you needn't apply.

9 Oh, and not forgetting the occasional beating administered by the sadistic guards of the imagination.

10 Regard yourself as a small corporation of one. Take yourself off on team-building exercises (long walks). Hold a Christmas party every year at which you stand in the corner of your writing room, shouting very loudly to yourself while drinking a bottle of white wine. Then masturbate under the desk. The following day you will feel a deep and cohering sense of embarrassment.

Helen Simpson

The nearest I have to a rule is a Post-it on the wall in front of my desk saying "*Faire et se taire*" (Flaubert), which I translate for myself as "Shut up and get on with it."

Zadie Smith

1 When still a child, make sure you read a lot of books. Spend more time doing this than anything else.

2 When an adult, try to read your own work as a stranger would read it, or even better, as an enemy would.

3 Don't romanticise your "vocation". You can either write good sentences or you can't. There is no "writer's lifestyle". All that matters is what you leave on the page.

4 Avoid your weaknesses. But do this without telling yourself that the things you can't do aren't worth doing. Don't mask self-doubt with contempt.

5 Leave a decent space of time between writing something and editing it.

6 Avoid cliques, gangs, groups. The presence of a crowd won't make your writing any better than it is.

7 Work on a computer that is disconnected from the internet.

8 Protect the time and space in which you write. Keep everybody away from it, even the people who are most important to you.

9 Don't confuse honours with achievement.

10 Tell the truth through whichever veil comes to hand – but tell it. Resign yourself to the lifelong sadness that comes from never being satisfied.

Colm Tóibín

1 Finish everything you start.

2 Get on with it.

3 Stay in your mental pyjamas all day.

4 Stop feeling sorry for yourself.

5 No alcohol, sex or drugs while you are working.

6 Work in the morning, a short break for lunch, work in the afternoon and then watch the six o'clock news and then go back to work until bed-time. Before bed, listen to Schubert, preferably some songs.

7 If you have to read, to cheer yourself up read biographies of writers who went insane.

8 On Saturdays, you can watch an old Bergman film, preferably *Persona* or *Autumn Sonata*.

9 No going to London.

10 No going anywhere else either.

Rose Tremain

1 Forget the boring old dictum "write about what you know". Instead, seek out an unknown yet knowable area of experience that's going to enhance your understanding of the world and write about that.

2 Nevertheless, remember that in the particularity of your own life lies the seedcorn that will feed your imaginative work. So don't throw it all away on autobiography. (There are quite enough writers' memoirs out there already.)

3 Never be satisfied with a first draft. In fact, never be satisfied with your own stuff at all, until you're certain it's as good as your finite powers can enable it to be.

4 Listen to the criticisms and preferences of your trusted "first readers".

5 When an idea comes, spend silent time with it. Remember Keats's idea of Negative Capability and Kipling's advice to "drift, wait and obey". Along with your gathering of hard data, allow yourself also to dream your idea into being.

6 In the planning stage of a book, don't plan the ending. It has to be earned by all that will go before it.

7 Respect the way characters may change once they've got 50 pages of life in them. Revisit your plan at this stage and see whether certain things have to be altered to take account of these changes.

8 If you're writing historical fiction, don't have well-known real characters as your main protagonists. This will only create biographical unease in the readers and send them back to the history books. If you must write about real people, then do something post-modern and playful with them.

9 Learn from cinema. Be economic with descriptions. Sort out the telling detail from the lifeless one. Write dialogue that people would actually speak.

10 Never begin the book when you feel you want to begin it, but hold off a while longer.

Sarah Waters

1 Read like mad. But try to do it analytically – which can be hard, because the better and more compelling a novel is, the less conscious you will be of its devices. It's worth trying to figure those devices out, however: they might come in useful in your own work. I find watching films also instructive. Nearly every modern Hollywood blockbuster is hopelessly long and baggy. Trying to visualise the much better films they would have been with a few radical cuts is a great exercise in the art of story-telling. Which leads me on to . . .

2 Cut like crazy. Less is more. I've often read manuscripts – including my own – where I've got to the beginning of, say, chapter two and have thought: "This is where the novel should actually start." A huge amount of information about character and backstory can be conveyed through small detail. The emotional attachment you feel to a scene or a chapter will fade as you move on to other stories. Be business-like about it. In fact . . .

3 Treat writing as a job. Be disciplined. Lots of writers get a bit OCD-ish about this. Graham Greene famously wrote 500 words a day. Jean Plaidy managed 5,000 before lunch, then spent the afternoon answering fan mail. My minimum is 1,000 words a day – which is sometimes easy to achieve, and is sometimes, frankly, like shitting a brick, but I will make myself stay at my desk until I've got there, because I know that by doing that I am inching the book forward. Those 1,000 words might well be rubbish – they often are. But then, it is always easier to return to rubbish words at a later date and make them better.

4 Writing fiction is not "self-expression" or "therapy". Novels are for readers, and writing them means the crafty, patient, selfless construction of effects. I think of my novels as being something like fairground rides: my job is to strap the reader into their car at the start of chapter one, then trundle and whizz them through scenes and surprises, on a carefully planned route, and at a finely engineered pace.

5 Respect your characters, even the minor ones. In art, as in life, everyone is the hero of their own particular story; it is worth thinking about what your minor characters' stories are, even though they may intersect only slightly with your protagonist's. At the same time . . .

6 Don't overcrowd the narrative. Characters should be individualised, but functional – like figures in a painting. Think of Hieronymus Bosch's *Christ Mocked*, in which a patiently suffering Jesus is closely surrounded by four threatening men. Each of the characters is unique, and yet each represents a type; and collectively they form a narrative that is all the more powerful for being so tightly and so economically constructed. On a similar theme . . .

7 Don't overwrite. Avoid the redundant phrases, the distracting adjectives, the unnecessary adverbs. Beginners, especially, seem to think that writing fiction needs a special kind of flowery prose, completely unlike any sort of language one might encounter in day-to-day life. This is a misapprehension about how the effects of fiction are produced, and can be dispelled by obeying Rule 1. To read some of the work of Colm Tóibín or Cormac McCarthy, for example, is to discover how a deliberately limited vocabulary can produce an astonishing emotional punch.

8 Pace is crucial. Fine writing isn't enough. Writing students can be great at producing a single page of well-crafted prose; what they sometimes lack is the ability to take the reader on a journey, with all the changes of terrain, speed and mood that a long journey involves. Again, I find that looking at films can help. Most novels will want to move close, linger, move back, move on, in pretty cinematic ways.

9 Don't panic. Midway through writing a novel, I have regularly experienced moments of bowel-curdling terror, as I contemplate the drivel on the screen before me and see beyond it, in quick succession, the derisive reviews, the friends' embarrassment, the failing career, the dwindling income, the repossessed house, the divorce . . . Working doggedly on through crises like these, however, has always got me there in the end. Leaving the desk for a while can help. Talking the problem through can help me recall what I was trying to achieve before I got stuck. Going for a long walk almost always gets me thinking about my

manuscript in a slightly new way. And if all else fails, there's prayer. St Francis de Sales, the patron saint of writers, has often helped me out in a crisis. If you want to spread your net more widely, you could try appealing to Calliope, the muse of epic poetry, too.

10 Talent trumps all. If you're a really great writer, none of these rules need apply. If James Baldwin had felt the need to whip up the pace a bit, he could never have achieved the extended lyrical intensity of *Giovanni's Room*. Without "overwritten" prose, we would have none of the linguistic exuberance of a Dickens or an Angela Carter. If everyone was economical with their characters, there would be no *Wolf Hall* . . . For the rest of us, however, rules remain important. And, crucially, only by understanding what they're for and how they work can you begin to experiment with breaking them.

Jeanette Winterson

1 Turn up for work. Discipline allows creative freedom. No discipline equals no freedom.

2 Never stop when you are stuck. You may not be able to solve the problem, but turn aside and write something else. Do not stop altogether.

3 Love what you do.

4 Be honest with yourself. If you are no good, accept it. If the work you are doing is no good, accept it.

5 Don't hold on to poor work. If it was bad when it went in the drawer it will be just as bad when it comes out.

6 Take no notice of anyone you don't respect.

7 Take no notice of anyone with a gender agenda. A lot of men still think that women lack imagination of the fiery kind.

8 Be ambitious for the work and not for the reward.

9 Trust your creativity.

10 Enjoy this work!

http://www.guardian.co.uk/books/2010/feb/20/ten-rules-for-writing-fiction-part-one

African Burial Ground Visitor Center
A Burial Ground and Its Dead Are Given Life
By EDWARD ROTHSTEIN

Cemeteries are at least as much for the living as the dead. They are the locus of tribute and memory; they affirm connections to a place and its past.

So in 1991, when during construction of a General Services Administration office building in Lower Manhattan, graves were discovered 24 feet below ground, and when those remains led to the discovery of hundreds of other bodies in the same area, and when it was determined that these were black New Yorkers interred in what a 1755 map calls the "Negros Burial Ground," the earth seemed to shake from more than just machinery. The evidence created a conceptual quake, transforming how New York history is understood and how black New Yorkers connect to their past.

That is a reason why Saturday's opening of the African Burial Ground Visitor Center, near where these remains were reinterred, is so important. Among the scars left by the heritage of slavery, one of the greatest is an absence: where are the memorials, cemeteries, architectural structures or sturdy sanctuaries that typically provide the ground for a people's memory?

The discovery of this cemetery some two centuries after it was last used provided just such a foundation, disclosing not just a few beads, pins and buttons, but offering the first large-scale traces of black American experience in this region. Here, underneath today's commercial bustle, are tracts of land that for more than a century were relegated to the burial of the city's slaves and free blacks.

In all 419 bodies were discovered — giving a clue to how many others still lie under the foundations of Lower Manhattan. (Estimates have ranged from 10,000 to 20,000.)

The new visitor center, inside the federal building that was ultimately constructed over a portion of the excavation (the other part became a burial site and memorial), is meant to explain the site's significance — not a simple task, because the passions stirred by the discovery were not just historical, but also personal. There was a felt connection to the people, unearthed in their disintegrating coffins, who in the early decades of the city's settlement were often forced into its construction. A sacral regard for the dead was joined with a sense of identification and continuity.

The months after the discovery only amplified those passions. While the city has paved over a multitude of cemeteries in its hectic past, here the government's initial intention to exhume and preserve the remains while proceeding with its nearly $300 million construction project was sadly inadequate. Protests and political interventions led to the suspension of building and the revision of plans.

In 1993 the burial ground was placed on the National Register of Historic Places; in 2006 the memorial site was declared a national monument and placed under the oversight of the National Park Service. In 2007 a memorial sculptured by Rodney Leon was unveiled, and now the site's $4.4 million visitor center means to place it all in context.

To do this the center's exhibition (created by Amaze Design) combines a sense of communal rededication with a sense of historical enterprise that followed the 1991 discovery. A revision in popular understanding has taken place about slavery's history in New York City, evident in several recent books and an impressive series of shows at the New-York Historical Society. In the 18th century slaves may have constituted a quarter of the New York work force, making this city one of the colonies' largest slave-holding urban centers

For seven years scholars at Howard University, led by the anthropologist Michael L. Blakey, also examined every bone fragment and relic found at the site before they were ceremonially reinterred in 2003 at a memorial next to the slightly shrunken footprint of the new building. The scholarly reports, alluded to in some of the displays, show injuries to bones attributed to strenuous physical labor, signs of malnutrition and some physical indications (like filed teeth) of an African heritage.

These various themes do not always accompany one another felicitously in the exhibition; in fact the passion and the detached historical analysis often seem to trip over each other, but the overall impact is considerable. The visitor center also includes an introductory film, a shop and classroom space.

You leave the building to see the memorial itself, where in seven raised mounds containing crypts filled with coffins, all the human remains and artifacts were reinterred. At the memorial's center is the starkly ponderous $5 million monument of black granite designed by Mr. Leon.

The site seems carved out of the area's bleak office surroundings. It makes the past seem like an excision, a resurrection of an alien time and place, a reminder of what lies deep underfoot.

The initial appeal of the show is emotional, immediate. "You are standing where thousands of Africans buried their loved ones during the 1600s and 1700s," it begins. "Slave holders forcibly brought these men, women and children here from the Caribbean and Africa."

Displays are built around a life-size tableau in which a few black slaves gather around two wooden coffins — of a child and a man — about to be interred in the burial ground. We hear outdoor sounds along with the unfamiliar funereal chants of a woman leading the ceremony. The mourning figures, sculptured by Studio EIS, are uncannily affecting.

In keeping with the site's recent history, the personal becomes political. Throughout the exhibition, contemporary black New Yorkers are referred to as "the descendant community," a group with familial connections to the remains. "Reclaiming Our History" is the show's title.

And one part of the exhibition is an account of the struggle to preserve the site, paying tribute to political activism. Five "scrapbooks" outline the political battles and controversies. Racial radicals, serious scholarly arguments, national politics and impassioned community hearings all play roles.

The creation of the burial ground and the visitor center becomes, in the show, a consummation, a posthumous triumph. But there is also a tendency to exaggerate the effect of that activism. It became clear

relatively quickly what this site represented and that something more was required than a simple archaeological excavation.

The best parts of the exhibition are about the distant past. We learn, for example, that of the 419 graves examined, nearly half were of children. We see graphs comparing mortality in this gravesite and the Trinity Church graveyard (Trinity had forbidden the burial of blacks there in 1697); there was a significant difference in life expectancy.

Manual labor, as another display points out, also left its mark on bones. One schematic portrait of a man's skeleton points out that the skull is notable for a "thickened ridge where his shoulder and neck muscles connected to the back of his head," caused by heavy lifting.

And because nothing concrete is known about any of the remains — "only 20 percent" were found with any personal items and even those were minor — the exhibition smartly incorporates individual examples of slaves identified because they escaped, were freed or were sold. The displays also give a condensed survey of slavery in New York, its onerous laws, its rebellions and its perversities.

But the passions inspired by the burial ground seem to skew the account. One Howard University report is explicit: The "research agenda" was "designed and implemented" to address topics raised in community meetings. They were to focus on "the cultural and geographical origins" of those buried, "the quality of their lives under captivity," the ways they resisted and how they created new identities.

These are all important matters (though there is no evidence, as the exhibition says, that "determined activists and scientists created a new way to study past people's lives"). But some of the questions also seem to presume certain answers. A partial reading indicates that the reports themselves are impressive and cautious. But we don't really know from the displays what to make of the skeletal evidence of physical strain, or the fact that half the studied remains indicated malnutrition, without comparing those findings to bone samples of free manual workers of the period. This would surely reveal something about slavery in New York, even if limning its brutal nature might seem crude.

The show also asserts that the blacks buried here had close cultural connections with Africa. It would be surprising if there were no such connections, and there is some evidence here. Around the waist of one corpse was a string of beads and shells associated with African customs; the coffin of another is inscribed with a symbol that has been linked to an African "sankofa" sign (and turned into a logo now used for the visitor center and the outdoor monument). But the assertion of the connection, at least in the exhibition, reaches beyond the evidence; some of the tests were also apparently inconclusive.

And one exhibition section is devoted to contemporary African culture without showing any real connection with the burial ground or its artifacts. We see samples of cloth now made in Nigeria and Mali, a picture of a fabric market in Ghana, a pipe from Benin — though no cloth survived in the burial ground, and no pipe is mentioned as a relic.

The point is simply to establish an association. Instead it raises questions about it. A historian outside the Howard group has even challenged the assertion that the "sankofa" sign had the African meaning ascribed to it.

And while no such exhibition can fully pay attention to scholarly details, at times we seem guided here to ignore complications rather than understand them. The show says, for example, that all those buried here were slaves. But even the research panel's reports are less sweeping.

Certainly the vast majority were enslaved, but there is evidence of free blacks in New York, well before this gravesite was closed in the 1790s. Washington Square Park is on land once owned by free blacks whose farmsteads in the mid-17th century spread over 130 acres. And by 1790 a third of the city's blacks were free.

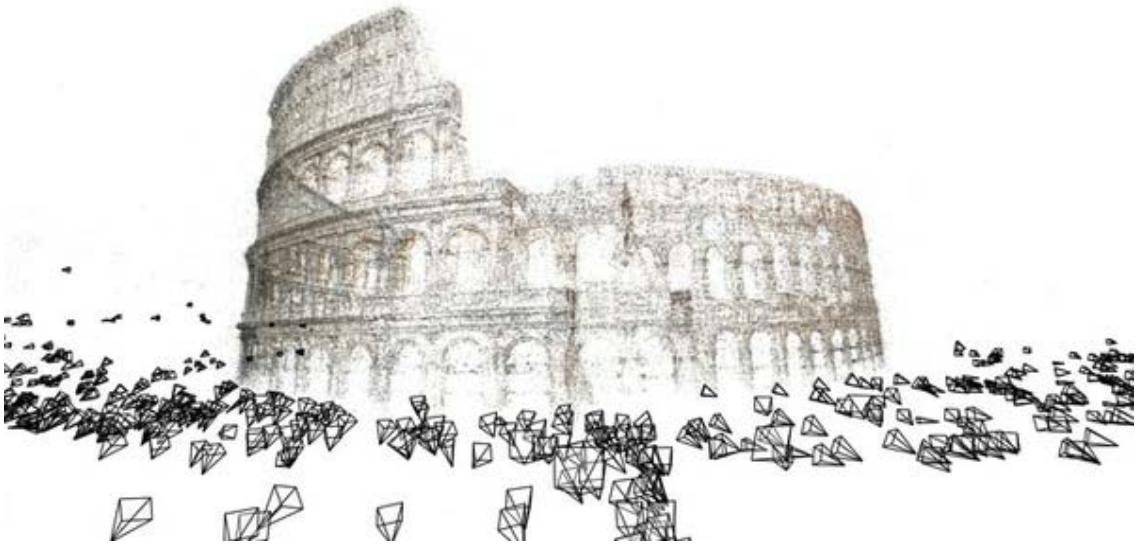
We are talking about small numbers of course, but all the numbers are small. New York's entire black population in the middle of the 18th century was no more than 2,500.

So there is still much more to be understood about the history of slavery and black Americans in New York. But in the meantime the burial ground gives back to both the "descendant community" and to everybody else a sense that we are all arising out of a more complex and painful past than we have often imagined.

The African Burial Ground Visitor Center opens on Saturday in the Ted Weiss Federal Building, 290 Broadway, at Duane Street, Lower Manhattan; (212) 637-2019; www.nps.gov/afbg.

http://www.nytimes.com/2010/02/26/arts/design/26burial.html?ref=design

Computers Turn Flat Photos Into 3-D Buildings
By JOHN MARKOFF



Rome wasn't built in a day, but in cyberspace it might be.

Computer science researchers at the University of Washington and Cornell University are deploying a system that will blend teamwork and collaboration with powerful graphics algorithms to create three-dimensional renderings of buildings, neighborhoods and potentially even entire cities.

The new system, PhotoCity, grew from the original work of a Cornell computer scientist, Noah Snavely, who while working on his Ph.D. dissertation at the University of Washington, developed a set of algorithms that generated three-dimensional models from unstructured collections of two-dimensional photos.

The original project was dubbed Photo Tourism and it has since been commercialized as Microsoft's Photosynth service, making it possible for users to upload collections of photos that can then be viewed in a quasi three-dimensional montage with a Web browser.

However, Photosynth collections are generally limited to dozens or hundreds of photos. The researchers wanted to push — or "scale" — their technology to be able to handle tens of thousands or even millions of photos. They also wanted to use computer processing power to transform the photos into true three-dimensional images, or what they refer to as a "dense point cloud."

The visualization technology is already able to quickly process large collections of digital photos of an object like a building and render ghostly and evocative three-dimensional images. To do this they use a three-stage set of algorithms that begins by creating a "sparse point cloud" with a batch of photos, renders it as a denser image, capturing much of the original surface texture of the object, and then renders it in three dimensions.

To improve the quality of their rendering capabilities, the researchers plan to integrate their computing system with a social game that will permit competing teams to add images where they are most needed to improve the quality of the visual models.

The PhotoCity game is already being played by teams of students at the University of Washington and Cornell, and the researchers plan to open it to the public in an effort to collect three-dimensional renderings in cities like New York and San Francisco. Contestants will be able to use either an iPhone application that uses the phone's camera, or upload collections of digital images.

In adopting what is known as a social computing or collective intelligence model, they are extending an earlier University of Washington research effort that combined computing and human skills to create a video game about protein folding.

The game, Foldit, was released in May 2008, allowing users to augment computing algorithms, solving visual problems where humans could find better solutions than computers. The game quickly gained a loyal following of amateur protein folders who became addicted to the challenges that bore a similarity to solving a Rubik's Cube puzzle.

The emergence of such collaborative systems has great promise for harnessing the creative abilities of people in tandem with networked computers, said Peter Lee, a Defense Advanced Research Projects Agency program manager who recently organized a team-based contest to use the Internet to quickly locate a series of red balloons hidden around the United States.

"The obvious thing to do is to try to mobilize a lot of people and get them to go out and take snapshots that contribute to this 3-D reconstruction," he said. "But maybe if enough people are involved someone will come up with a better idea of how to go about doing this."

Indeed, it was J. C. R. Licklider, a legendary official at the Defense Advanced Research Projects Agency, who was a pioneer in proposing the idea of a "man-computer symbiosis." While at Darpa, Dr. Licklider financed a series of research projects that led directly to the modern personal computer and today's Internet.

To entice volunteers, the researchers have created a Web site: photocitygame.com. Anyone who wants to be a "custodian" of a particular building or place can begin by uploading pictures of the site. To maintain control they will need to be part of the group that contributes the most photos, in a capture-the-flag-like competition.

"One of the nice things for the players is they can own the points they create, whether it's a building or a collection of buildings," said Kathleen Tuite, a University of Washington graduate student and a computer graphics researcher who is one of the designers of PhotoCity. She said the researchers were considering the idea of offering real world prizes that would create incentives similar to Geocaching, the popular Internet GPS game.

"Eventually, the goal is to create a game without boundaries, that expands to fill the world," Dr. Snavely said. " For now, we're focused on the scale of a college campus, or the heart of a city."

http://www.nytimes.com/2010/02/23/science/23crowd.html?ref=design

Designed to Help Uplift the Poor
By NICOLAI OUROUSSOFF

LOS ANGELES

LIKE almost every other American architect who came to prominence in the recent gilded age, Michael Maltzan built his reputation with commissions for prestigious museums and luxurious private houses. In 2002 he garnered national attention for his graceful design for the temporary Museum of Modern Art in Queens. His most recent projects include a flying-saucer-like house for the artists Lari Pittman and Roy Dowell in the foothills of the San Gabriel Mountains and a far grander, 28,000-square-foot Beverly Hills mansion — part art gallery, part home — for the investor and former Hollywood über-agent Michael Ovitz.

Yet Mr. Maltzan may be the only American architect of his stature with significant experience in a far less glamorous field: providing shelter and other accommodations for his city's poor. Over the past 16 years he has worked on several housing projects for the homeless and an arts complex for underprivileged children that are remarkable for their architectural sophistication and their spirit of public service.

His newest building, the Carver Apartments, a drum-shaped residential complex, strikes a tricky balance between two fundamental and often conflicting needs of the chronically homeless, for a sense of being protected, on the one hand, and regular human contact on the other. His next project, an elegant composition of prefabricated blocks that is still in the design phase, could make that nuanced approach available to many more people. Together these designs deliver a major blow to the conventional notion of contemporary architecture as little more than an indulgence of the rich or highly cultured.

Mr. Maltzan stumbled into the role of socially conscious architect. He arrived in Los Angeles in 1988 and was soon working for Frank Gehry, then still a cult figure for young architects looking for a way out of the malaise of postmodernism. In 1993, while at work on the early stages of the Walt Disney Concert Hall design, Mr. Maltzan was approached by Irwin Jaeger, a businessman, and Bob Bates, an artist, to look at a garbage-strewn lot at the edge of Skid Row where they were planning to build a home for Inner City Arts, an after-school program.

The project became Mr. Maltzan's first solo commission. A complex of studio spaces clustered around landscaped courtyards, its sculptured white stucco buildings and raw interiors evoked the lyrical architectural forms of Alvaro Siza as well as the sculptural compositions of Mr. Gehry's work, suggesting a young architect easing into his own voice.

It also demonstrated an unusual sensitivity for those who taught and worked there. The comforting scale of the gardens and studios, animated by light funneling through big skylights and windows set at the eye level of a small child, imbue these spaces with a warmth that is rare in low-budget construction.

The project attracted the attention of the Skid Row Housing Trust, an organization dedicated to providing permanent homes for the most vulnerable members of the downtown homeless population — people with a combination of disabling conditions like drug addictions, mental illnesses and physical disabilities who had drifted in and out of shelters for years.

Mr. Maltzan's first building for the trust, the Rainbow apartment complex, is surrounded by Skid Row's sprawling encampments. To shelter the tenants from the nearby misery, Mr. Maltzan oriented its 87 apartments around a big ceremonial staircase and an outdoor courtyard. From a shared top-floor terrace, tenants look over toward the glittering towers of the business district a few blocks away, which in this neighborhood can sometimes seem an unreachable oasis of prosperity and calm. The project, completed in 2006, offered a sharp contrast to the soul-crushing atmosphere of more typical homeless shelters, from which many of its tenants had been plucked.

"People who are in the shelter-shuttle, going from one to another, are relatively anonymous," said Mike Alvidrez, the housing trust's director. "And in an old-fashioned S.R.O., you're sealed off from the outside and each other. Rainbow spawned this whole interaction between people who didn't know one another.

"You never know what form it's going to take," he added. The kitchen opens onto the courtyard, for example, which promotes outdoor gatherings; the courtyard's planters spawned a gardening club; the community room gave rise to yoga classes and other activities. There are now 15 to 20 clubs operating in the complex.

By the time Mr. Alvidrez hired Mr. Maltzan to design the Carver Apartments, a 97-unit building on a corner about a mile away, the group's architectural ambitions had grown in scope.

"Rainbow triggered a lot of ideas," Mr. Alvidrez said. "What we started to learn is how the design can help people get stabilized as a community. For us the building became part of the recovery."

The Carver Apartments were designed to serve the same population as Rainbow, but the context of the new building raises distinct challenges. It stands in the middle of a neighborhood of dilapidated warehouses and empty lots, with an elevated section of the 10 Freeway pressing up against it to the south. On a recent weekday morning the only sign of life on the ground was a homeless man silently setting down his shoes just outside his tent underneath a freeway on-ramp.

At first glance the building seems to hold itself somewhat aloof from this setting. Its crisp white cylindrical exterior is broken into a series of saw-tooth-like vertical ridges. A pattern of narrow horizontal and vertical windows, designed to keep out the noise and exhaust fumes, contributes to its slightly defensive air.

As Mr. Maltzan explained the first time we toured the site: "One of the first things people do when they live on the street is put up walls around themselves to try to create some feeling of safety. You need to provide those walls before you can start to open things back up."

He brings the same level of architectural intelligence to those walls that he does to the design of a mogul's house. The building's curved facade, for example, mirrors the curve of the freeway on-ramp, so

that as you approach along one of the two streets that border it, the curves seem to converge, creating a sense of acceleration and pulling you around to the front of the building. When you reach the main entrance, the momentum slows, and the scene becomes more peaceful. The faceted concrete box of the lobby pushes out toward the sidewalk as if to invite you inside.

The anticipation builds once again as you move toward the building's central courtyard, a dreamy cylindrical space that is dominated by a grand staircase. A ring of sheet-metal fins climb the full height of the space, accentuating its vertical thrust, and your eye intuitively follows them up past several rows of balconies to a perfect circle of California sky.

The sense of compression brings to mind the "social condensers" created by Soviet avant-garde architects in the 1920s, communal spaces designed as a means of breaking down bourgeois individualism. But the courtyard has more to do with psychological healing than with utopianism. It is an inner sanctuary meant to nurture a sense of security — not mass conformity.

To keep this feeling from becoming too suffocating, Mr. Maltzan makes a series of bold cuts through other parts of the building, creating surprising visual connections to the world outside. A counter in the communal kitchen, for example, lines up with a slot that runs diagonally through the entire ground floor, framing views of the freeway's underbelly on one end and back toward Skid Row on the other.

The most unexpected of these views is in the laundry and community room on the third floor. Conceived as the building's domestic heart, the room overlooks a section of the elevated freeway through a long horizontal window. The window is made of acoustical glass, so that even at midday the noise is reduced to a soft hum. But it is so close to the passing cars that at rush hour, when traffic is barely moving, tenants and drivers can make direct and prolonged eye contact. Late at night, when the freeway is nearly empty, the cars flow by in a dreamy rhythm.

It's a witty, even poetic moment, one that captures the dueling essences of Los Angeles: the promise of freedom and opportunity embodied by its freeways and the degree to which that promise has turned out to be a fantasy.

But Mr. Maltzan's housing experiments also suggest another way of thinking about the city. For much of the 20th century many architects vehemently believed in the world-changing power of their art. The age of mass production would create light-filled environments, sweeping away the squalor of urban slums. A profession that had traditionally served an aristocratic elite would now raise up the masses.

That dream, of course, collapsed decades ago, a victim of corrupting political and economic forces, mediocre talents and its own ideological rigidity. In its final days it was reduced to a few dehumanizing formulas for generic housing blocks and office towers. A generation of architects never recovered from the trauma.

Like others who were raised in the postmodern era, Mr. Maltzan is not directly invested in that history. Nor is he interested in coming up with a new ideological formula. His idea of progress is incremental — the kind that can be tested through careful observation of everyday experiences. His aim has been to find a rhythm that accounts for the often conflicting needs of the human condition.

The Carver Apartments are the next step in this quest. The building not only manages to provide a feeling of security while easing the crippling sense of isolation that can often afflict the homeless; it also makes visible, through its strong architectural form, a group of people that many in our society would often prefer to ignore.

http://www.nytimes.com/2010/02/21/arts/design/21maltzan.html?ref=design