Infoteca's E-Journal

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Sistema de Infotecas Centrales, Universidad Autónoma de Coahuila

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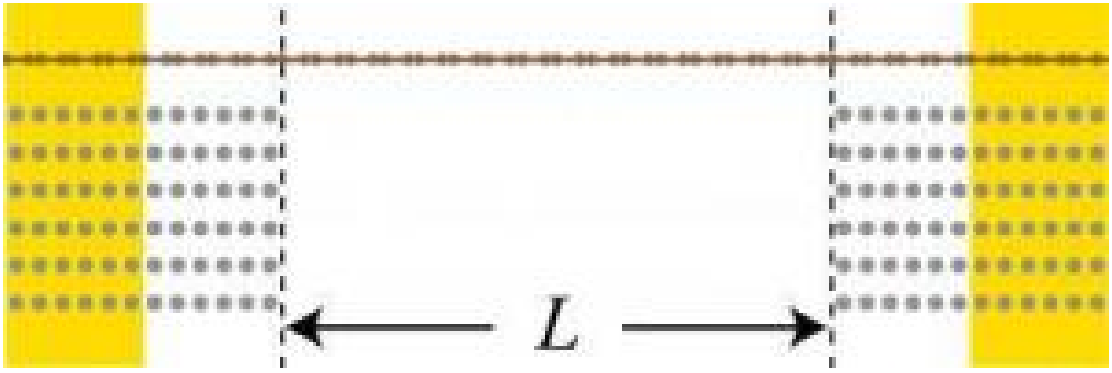
Quantifying the Electron Transport Effects of Placing Metal Contacts Onto Graphene



This figure illustrates the atomistic arrangement of aluminum and carbon atoms in the junctions studied by the Georgia Tech team. (Credit: Georgia Tech image)

ScienceDaily (Mar. 4, 2010) — Using large-scale supercomputer calculations, researchers have analyzed how the placement of metallic contacts on graphene changes the electron transport properties of the material as a factor of junction length, width and orientation. The work is believed to be the first quantitative study of electron transport through metal-graphene junctions to examine earlier models in significant detail.

Information on the ways in which attaching metal contacts affects electron transport in graphene will be important to scientists studying the material -- and to designers who may one day fabricate electronic devices from the carbon-lattice material.

"Graphene devices will have to communicate with the external world, and that means we will have to fabricate contacts to transport current and data," said Mei-Yin Chou, a professor and department chair in the School of Physics at the Georgia Institute of Technology. "When they put metal contacts onto graphene to measure transport properties, researchers and device designers need to know that they may not be measuring the instrinsic properties of pristine graphene. Coupling between the contacts and the material must be taken into account."

Information on the effects of metal contacts on graphene was reported in the journal *Physical Review Letters* on February 19th. The research was supported by the U.S. Department of Energy, and involved interactions with researchers at the National Science Foundation (NSF)-supported Materials Research Science and Engineering Center (MRSEC) at Georgia Tech.

Using large-scale, first-principles calculations done at two different NSF-supported supercomputer centers, the Georgia Tech research team -- which included postdoctoral fellows Salvador Barraza-Lopez and Mihajlo Vanevic, and assistant professor Markus Kindermann -- conducted detailed atomic-level calculations of aluminum contacts grown on graphene.

The calculations studied two contacts up to 14 nanometers apart, with graphene suspended between them. In their calculations, the researchers allowed the aluminum to grow as it would in the real world, then studied how electron transfer was induced in the area surrounding the contacts.

"People have been able to come up with phenomenological models that they use to find out what the effects are with metallic contacts," Chou explained. "Our calculations went a few steps farther because we built contacts atom-by-atom. We built atomistically-resolved contacts, and by doing that, we solved this problem at the atomic level and tried to do everything consistent with quantum mechanics."

Because metals typically have excess electrons, physically attaching the contacts to graphene causes a charge transfer from the metal. Charge begins to be transferred as soon as the contacts are constructed, but ultimately the two materials reach equilibrium, Chou said.

The study showed that charge transfer at the leads and into the freestanding section of the material creates an electron-hole asymmetry in the conductance. For leads that are sufficiently long, the effect creates two conductance minima at the energies of the Dirac points for the suspended and clamped regions of the graphene, according to Barraza-Lopez.

"These results could be important to the design of future graphene devices," he said. "Edge effects and the impact of nanoribbon width have been studied in significant detail, but the effects of charge transfer at the contacts may potentially be just as important."

The researchers modeled aluminum, but believe their results will apply to other metals such as copper and gold that do not form chemical bonds with graphene. However, other metals such as chromium and titanium do chemically alter the material, so the effects they have on electron transport may be different.

Beyond the new information provided by the calculations, the research further proposes quantitative models that can be used under certain circumstances to describe the impact of the contacts.

"Earlier models had been based on physical insights, but nobody really knew how faithfully they described the material," Kindermann said. "This is the first calculation to show that these earlier models apply under certain circumstances for the systems that we studied."

Data from the study may one day help device designers engineer graphene circuits by helping them understand the effects they are seeing.

"When we modify graphene, we need to understand what changes occur as a result of adding materials," added Chou. "This is really fundamental research to understand these effects and to have a numerical prediction for what is going on. We are helping to understand the basic physics of graphene."

This research was supported by Department of Energy grant DE-FG02-97ER45632.

Story Source:

Adapted from materials provided by Georgia Institute of Technology. Original article written by John Toon.

http://www.sciencedaily.com/releases/2010/02/100224103404.htm

Students' Physical Fitness Associated With Academic Achievement; Organized Physical Activity

ScienceDaily (Mar. 4, 2010) — Physical fitness is associated with academic performance in young people, according to a report presented at the American Heart Association's 2010 Conference on Nutrition, Physical Activity and Metabolism.

"As children's health continues to be a concern -- especially when it comes to obesity -- some have suggested that children's physical fitness is associated with their academic performance," said Lesley A. Cottrell, Ph.D., study presenting author and associate professor of pediatrics at West Virginia University in Morgantown, W.Va. "The research, however, had not developed enough to define the nature of that relationship."

To study the association between children's physical fitness and academic performance, Cottrell and colleagues analyzed the body mass index percentiles, fitness levels and standardized academic test scores of 725 fifth grade students in Wood County, W.Va. The researchers focused more on the children's fitness level than their weight. They then compared that data to students' fitness and academic performance two years later, in the seventh grade.

They separated the participants into four groups of students who were:

- in high physical fitness levels in fifth grade and remained so in seventh grade;
- fit in fifth grade but had lost their fitness by seventh grade;
- not fit in fifth grade but were physically fit by seventh grade;
- not physically fit at the beginning of the study, in fifth grade, nor at the end of the study, in seventh grade.

Children who had the best average scores in standardized tests in reading, math, science and social studies were fit at the start and end of the study, researchers found. The next best group, academically, in all four subjects, was made up of children who were not fit in fifth grade but had become fit by seventh grade. The children who had lost their fitness levels between fifth and seventh grades were third in academic performance. Children who were not physically fit in either the fifth or seventh grades had the lowest academic performance."The take-home message from this study is that we want our kids to be fit as long as possible and it will show in their academic performance," Cottrell said. "But if we can intervene on those children who are not necessarily fit and get them to physically fit levels, we may also see their academic performance increase."

Youth who are regularly active also have a better chance of a healthy adulthood. The American Heart Association recommends that children and adolescents should do 60 minutes or more of physical activity daily and they participate in physical activities that are appropriate for their age and enjoyable.

The study suggests that focusing more on physical fitness and physical education in school would result in healthier, happier and smarter children, Cottrell said.

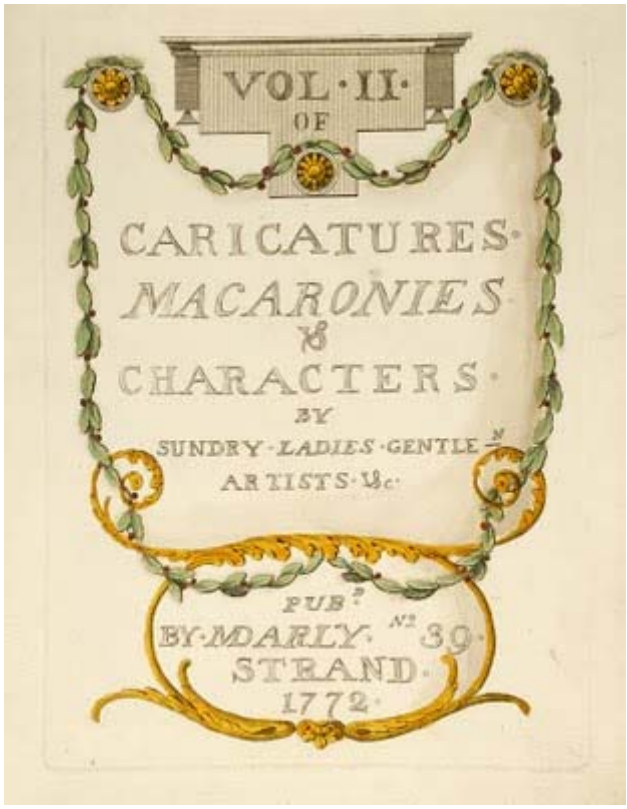
Co-authors are: Richard Wittberg, Ph.D., and Karen Northrup, M.S.N. Author disclosures are on the abstract.

Story Source:

Adapted from materials provided by American Heart Association.
http://www.sciencedaily.com/releases/2010/03/100302185522.htm

The Mother of Pictorial Satire, or Why Did Yankee Doodle Call His Hat Macaroni?

Posted: 11 Mar 2010 12:30 AM PST



Despite their wide popularity and broad distribution, and their importance in the history of British caricature, the color-plate books and albums of Mary Darly are now quite rare.

Who was Mary Darly?

"Although most well-known cartoonists have been men, one of the most influential early figures in the field was a woman, Mary Darly. Though often overlooked in histories of the subject, women have played a significant part in the development of cartoons and caricature in Britain from its beginnings in the days of Hogarth almost 300 years ago right up to the present… However, the mother of them all, perhaps, was the eighteenth-century artist, engraver, writer, printseller, publisher and teacher, Mary Darly (fl.1756-79), who also wrote, illustrated and published the first ever manual on how to draw caricatures" (Bryant, The Mother of Pictorial Satire).

Her husband, Matthew, had established a print publishing and retaiing shop in 1756. The two immediately published a wealth of caricatures. What remains significant about this burst of activity is that it was the first time that caricature, which exaggerated facial features to comic effect, was joined to political satire.

"During the early 1770s, the rage for caricatures in London was fueled by the activities of the print publishers, Matthew and Mary Darly, who flooded the market with their wry visual commentaries on social life. Among their productions were dozens of prints representing a group of men labeled by contemporaries as 'macaronis,' allegedly because of their affectation of foreign tastes and fashions. The macaronis were an ephemeral phenomenon, as well as an extension of the fops and beaus of the earlier part of the century. They were called, among other epithets, 'noxious vermin,' 'that doubtful gender,' and

'amphibious creatures,' and were compared variously to monsters, devils, reptiles, women, monkeys, asses, and butterflies.

“Their concern for elaborate clothing, including tight trousers, large wigs, short coats, and small hats made them the ridicule of their generation, who focused on their gender ambiguity and the dangers of their conformity to foreign and effeminate fashion. A contemporary pamphlet, The Vauxhall Affray, sums up this view: 'But Macaronies are a sex Which do philosophers perplex; Tho' all the priests of Venus's rites Agree they are Hermaphrodites. This gender ambiguity is the aspect of the representational life...' (West, *The Darly Macaroni Prints and the Politics of "Private Man."* Eighteenth-Century Life 25.2 [2001] pp.170-182).

"…the marks that had been codified into the macaroni type [were]: fine sprigged fabric, tight clothes, oversized sword, tasseled walking stick, delicate shoes, and, most recognizably, an enormous wig. This wig, combining a tall front with a fat queue or "club" of hair behind, was the feature that epitomized the macaroni's extravagant artifice during London's macaroni craze of the early 1770s. Named for the pasta dish that rich young Grand Tourists brought back from their sojourns in Rome, the macaroni was known in the 1760s as an elite figure marked by the cultivation of European travel. But as The Macaroni and Theatrical Magazine explained in its inaugural issue in 1772, 'the word Macaroni then changed its meaning to that of a person who exceeded the ordinary bounds of fashion; and is now justly used as a term of reproach to all ranks of people, indifferently, who fall into this absurdity.' Macaroni fashion was contagious, and as it spread beyond its original cadre into the rising..." (Rauser, *Hair, Authenticity, and the Self-Made Macaroni.* Eighteenth-Century Studies 38.1 [2004] pp. 101-117).

"In 1762 [Mary Darly] assumed responsibility for this aspect of their business...She described herself as ‘Fun Merchant, at the Acorn in Ryder's Court, Fleet Street’ (Clayton, 215)...When, in early 1762, a new shop at the Acorn in Ryder's Court near Leicester Fields began to advertise caricatures, it was Mary Darly who was named as publisher. Her principal targets were the dowager princess of Wales, her alleged paramour the earl of Bute, and his allegedly locust-like Scottish friends and relations, of whom the Darlys promised prints ‘as fast as their Needles will move, and Aqua fortis Bite’ (Public Advertiser, 28 Sept 1762).

“To this end Mary welcomed contributions from the general public: ‘Gentlemen and Ladies may have any Sketch or Fancy of their own, engraved, etched &c. with the utmost Despatch and Secrecy’ (ibid.). That she herself was the etcher of these designs was established by her offer to ‘have them either Engrav'd, etched, or Dry-Needled, by their humble Servant’ (ibid.). In October she published the first part of Principles of Caricatura (1762) which according to the title-page provided guidance in drawing caricatures and which reinforced her offer to give exposure in the capital to the ideas of provincial amateurs: ‘any carrick will be etched and published that the Authoress shall be favoured with, Post paid’...Mary Darly fostered enthusiasm for graphic satire, cultivated a polite audience, and increased sensitivity to caricature as an artistic convention.

"In the early 1770s...the Darlys relinquished political satire and instead published satires of fashion, manners, and well-known individuals. Inviting sketches and ideas, they warned that ‘illiberal and indelicate Hints, such as one marked A. Z. [were] not admissible’ and that ‘low or political Subjects will not be noticed’ (Public Advertiser, 15 and 22 Oct 1) Contributions were received from a variety of amateurs, including the talented William Henry Bunbury, Edward Topham, and Richard St George Mansergh. Prints mocking affected macaronis and extremes of dress and coiffure were characteristic. In 1773 they held an exhibition of 233 original drawings for prints. Collected sets were offered from 1772 with a portrait of Matthew Darly dated 1771 as frontispiece (BM 4632). (Timothy Clayton, *Matthew Darly*. Oxford Dictionary of National Biography, Oxford University Press, 2004).

I’m writing as I ride a pony into town, a feather in my hat. Suddenly, I have an urge for pasta. Why? Where is Mario Batali when you need him?

The Macaroni character plays a role in the American Revolution. "Singing a song in Revolutionary America was not necessarily an innocent act...One of these songs [Yankee Doodle], which told the story of a poorly dressed Yankee simpleton, or 'doodle,' was so popular with British troops that they played it as they marched to battle on the first day of the Revolutionary War. The rebels quickly claimed the song as their own, though, and created dozens of new verses that mocked the British" (Yankee Doodle - Lyrical Legacy at the Library of Congress).

"Why did yankee doodle stick a feather in his hat and call it macaroni? Back in Pre-Revolutionary America when the song 'Yankee Doodle' was first popular, the singer was not referring to the pasta 'macaroni' in the line that reads 'stuck a feather in his hat and called it macaroni.' 'Macaroni' was a fancy ('dandy') style of Italian dress widely imitated in England at the time. So by just sticking a feather in his cap and calling himself a 'Macaroni' (a 'dandy'), Yankee Doodle was proudly proclaiming himself to be a country bumpkin, because that was how the English regarded most colonials at that time" (United States National Institute of Environmental Health Sciences).

Well, there you have it. Is it too much of a stretch to wonder if the culture wars in America began when colonial hayseeds internalized their status as an elite class of Revolutionary War citizens to proudly distain intellectualism and urbanity?

I don't know. But my parrot has just dropped a flight feather into my bowl of *penne bolognese*, which I shall now proudly place upside down upon my head as a pasta-hat in tribute to the Yankee-yokels who threw the Brits' scorn back at them with wit. I am, as ever, the soul of patriotic dignity.

American humor: It's straight line from Yankee-Doodle to Hee-Haw, detour to the Borscht Belt nonwithstanding.

Images from ***24 Caricatures by Several Ladies, Gentlemen, Artists, &c.*** and volume ll of ***Caricatures, Macaronies & Characters by Sundry Ladies, Gentle.n, Artists, &c***. [London]: M Darly, No. 39 Strand, 1771-1772, and courtesy of David Brass.

http://feedproxy.google.com/~r/BookPatrol/~3/uk3CqjMTpz4/mother-of-pictorial-satire-or-why-did.html?utm_source=feedburner&utm_medium=email

Fresh Approaches to Sparking Creativity

By: Tom Jacobs | March 9, 2010 | 12:32 PM (PDT) |

Newly published research describes two innovative methods to inspire creativity: Compare and contrast different cultures, or think of yourself as a 7-year-old.

"All children are artists," Pablo Picasso once observed. "The problem is how to remain an artist once he grows up." Pablo's puzzle, which feels increasingly urgent as creativity is linked to both psychological well-being and economic competiveness, is addressed in two new papers that propose simple catalysts to imaginative thinking.

One study finds exploring contrasts and commonalities between cultures helps unlock creativity — news that would not surprise Picasso, who was strongly influenced by African art. The second suggests seeding the imagination is as simple as allowing yourself to think like a 7-year-old.

The research on multiculturalism and creativity was conducted by two scholars from Singapore and published in the *Journal of Cross-Cultural Psychology*. Lead author Angela Ka-yee Leung of Singapore Management University describes five studies that show "multicultural experiences can provide a valuable cognitive resource for creative thinking."

In one study, 65 American college students, all of European ancestry, participated in two creativity tests. Specifically, they read a summary of the Cinderella story and wrote a new version of it for Turkish children. They were given a few facts about Turkey and the everyday life of its citizens and were instructed to "use their wildest imagination."

The participants were divided into five groups, the first of which began the assignment with no advance preparation. The other four viewed an approximately 45-minute presentation including still photos, music videos and movie trailers.

One group saw material culled from contemporary American culture, including architecture, scenery, apparel and cuisine; the second watched similar material reflecting Chinese culture. The third was exposed to both Chinese and American cultures, with characteristic images from both shown back to

back. The fourth viewed images of Chinese-American culture, including foods such as rice burgers that combine elements from both traditions.

Their stories were judged by independent coders who assessed their creative content. Those written by students who saw images of both cultures, as well as those exposed to fusion culture, were significantly more creative than those written by the control group. Exposure simply to American or Chinese culture did not have the same effect.

The students were brought back into the lab five to seven days later and asked to perform a different creative experiment. Once again, those in the dual cultures and fusion culture groups scored highest, suggesting the effect of the multicultural exposure did not wear off rapidly.

The results suggest exposure to multiculturalism enhances "creativity-supporting cognitive skills, such as a spontaneous tendency to sample ideas from divergent sources and to attempt creative integration of seemingly unconnected ideas," the researchers write.

They go on to note that this positive relationship is significantly weakened "in situations where individuals crave firm answers or are preoccupied with mortality concerns." Of course, neither of those mindsets provide a particularly fertile environment for creativity in any case.

In the second paper, published in the journal *Psychology of Aesthetics, Creativity and the Arts*, psychologists Darya Zabelina and Michael Robinson of North Dakota State University describe a study featuring 76 undergraduates. The students were asked to imagine that school was canceled for the day and instructed to write detailed, specific descriptions of what they would think, feel and do in such a situation.

For half the participants, the phrase "You are seven years old" was added to their instructions. All their responses were assessed using a version of the Torrance Test of Creative Thinking.

"Individuals randomly assigned to the mindset condition involving childlike thinking subsequently exhibited higher levels of creative originality than did those in the control condition," the researchers report. They add that their findings indicate "it is possible to recapture the spirit of play and exploration characteristic of childlike thinking."

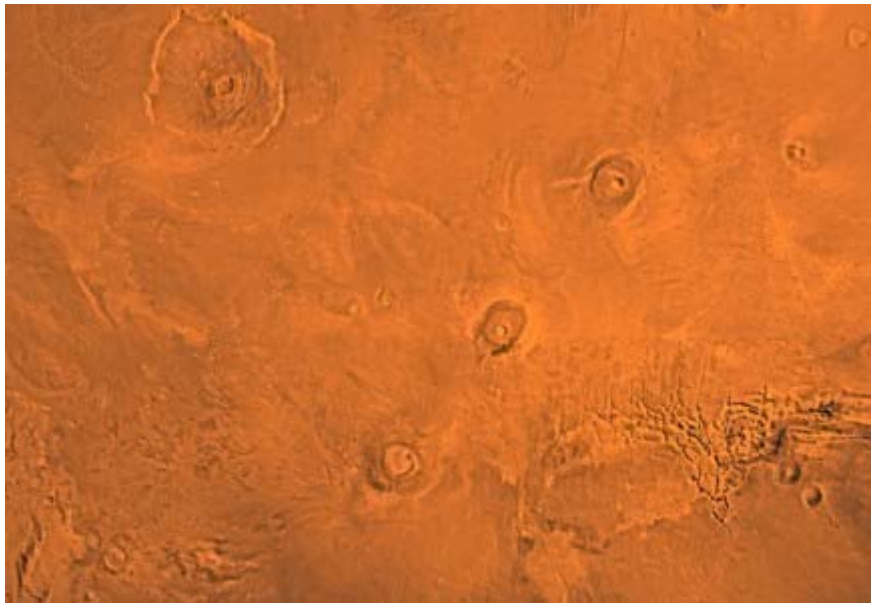
Looking at practical applications, the researchers suggest games and "guided imagery exercises designed to facilitate a childlike mindset" could help foster originality in both the classroom and the workplace. "Our results reveal that even very short-term interventions designed to focus individuals on spontaneous thinking and play are likely to be effective in fostering creative originality," they write.

Anyone for a quick round of Duck Duck Goose?

http://www.miller-mccune.com/culture-society/fresh-approaches-to-sparking-creativity-10516/

Gas on Mars Silent But Not Deadly

By: Matt Palmquist | March 10, 2010 | 09:00 AM (PDT) |



Scientists weigh the possibility that methane gas on Mars comes from microorganisms in the soil.

Scientists have ruled out the possibility that the presence of methane gas on Mars is due to meteorites or volcanic activity.

Recent research in the journal *Earth and Planetary Science Letters* highlights the hope that the consistent levels of methane on the Red Planet could be the result of microorganisms in the Martian soil that are producing the gas as a "by-product of their metabolic processes."

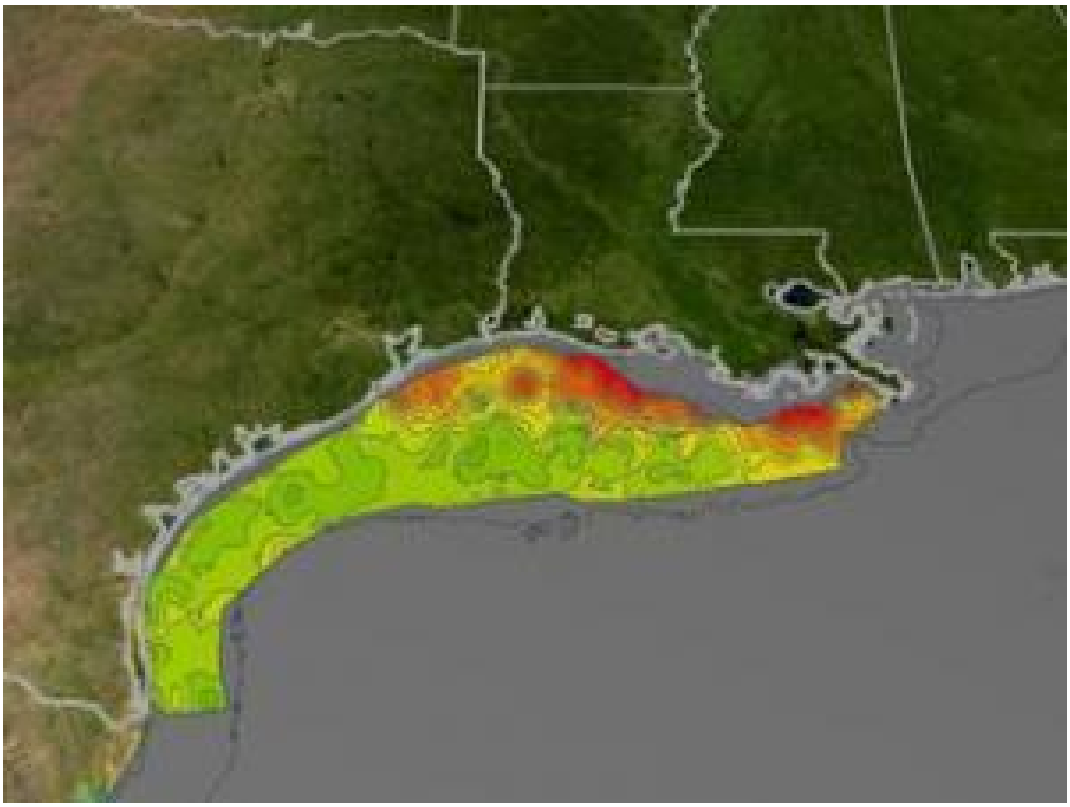
"As Sherlock Holmes said, 'Eliminate all other factors and the one that remains must be the truth,'" said professor Mark Sephton of the department of earth science and engineering at Imperial College London in a press release, stepping delicately around the subject. "The list of possible sources of methane gas is getting smaller and excitingly, extraterrestrial life still remains an option. Ultimately the final test may have to be on Mars."

In other words, the search for extraterrestrial life has been reduced to … drum-roll please … alien farts.

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

http://www.miller-mccune.com/science-environment/gas-on-mars-silent-but-not-deadly-10411/

Aquatic 'Dead Zones' Contributing to Climate Change



Mississippi dead zone in 2006. The increased frequency and intensity of oxygen-deprived "dead zones" along the world's coasts can negatively impact environmental conditions in far more than just local waters. (Credit: NASA/Goddard Space Flight Center Scientific Visualization Studio)

ScienceDaily (Mar. 12, 2010) — The increased frequency and intensity of oxygen-deprived "dead zones" along the world's coasts can negatively impact environmental conditions in far more than just local waters. In the March 12 edition of the journal *Science*, University of Maryland Center for Environmental Science oceanographer Dr. Lou Codispoti explains that the increased amount of nitrous oxide (N_2O) produced in low-oxygen (hypoxic) waters can elevate concentrations in the atmosphere, further exacerbating the impacts of global warming and contributing to ozone "holes" that cause an increase in our exposure to harmful UV radiation.

"As the volume of hypoxic waters move towards the sea surface and expands along our coasts, their ability to produce the greenhouse gas nitrous oxide increases," explains Dr. Codispoti of the UMCES Horn Point Laboratory. "With low-oxygen waters currently producing about half of the ocean's net nitrous oxide, we could see an additional significant atmospheric increase if these 'dead zones' continue to expand."

Although present in minute concentrations in Earth's atmosphere, nitrous oxide is a highly potent greenhouse gas and is becoming a key factor in stratospheric ozone destruction. For the past 400,000 years, changes in atmospheric N_2O appear to have roughly paralleled changes in carbon dioxide CO_2 and have had modest impacts on climate, but this may change. Just as human activities may be causing an unprecedented rise in the terrestrial N_2O sources, marine N_2O production may also rise substantially as a result of nutrient pollution, warming waters and ocean acidification. Because the marine environment is a net producer of N_2O, much of this production will be lost to the atmosphere, thus further intensifying its climatic impact.

Increased N_2O production occurs as dissolved oxygen levels decline. Under well-oxygenated conditions, microbes produce N_2O at low rates. But at oxygen concentrations decrease to hypoxic levels, these waters can increase their production of N_2O.

N_2O production rates are particularly high in shallow suboxic and hypoxic waters because respiration and biological turnover rates are higher near the sunlit waters where phytoplankton produce the fuel for respiration.

When suboxic waters (oxygen essentially absent) occur at depths of less than 300 feet, the combination of high respiration rates, and the peculiarities of a process called denitrification can cause N_2O production rates to be 10,000 times higher than the average for the open ocean. The future of marine N_2O production depends critically on what will happen to the roughly ten percent of the ocean volume that is hypoxic and suboxic.

"Nitrous oxide data from many coastal zones that contain low oxygen waters are sparse, including Chesapeake Bay," said Dr. Codispoti. "We should intensify our observations of the relationship between low oxygen concentrations and nitrous oxide in coastal waters."

Story Source:

Adapted from materials provided by University of Maryland Center for Environmental Science.

Journal References:

1. Louis A. Codispoti. **Interesting Times for Marine N_2O**. *Science*, March 12, 2010 DOI: 10.1126/science.1184945
2. Sheng et al. **A dinoflagellate exploits toxins to immobilize prey prior to ingestion**. *Proceedings of the National Academy of Sciences*, 2010; 107 (5): 2082 DOI: 10.1073/pnas.0912254107

http://www.sciencedaily.com/releases/2010/03/100311141213.htm

End to Lice? Effectiveness of New Oral Treatment Demonstrated

ScienceDaily (Mar. 12, 2010) — French medical researchers from the AP-HP (Henri Mondor Hospital and Avicenne Hospital) and Inserm (Unit 738 "Models and methods for therapeutic evaluation of chronic illnesses" and CIC 202, at Tours) have recently demonstrated the effectiveness of a new molecule in the fight against lice. Faced with the emergence of increasing resistance to conventional treatments by these parasites, this new medication represents a real therapeutic alternative which is effective in 95% of cases.

This work has been published in the March 11th edition of The *New England Journal of Medicine*.

Lice are parasites which infest more than 100 million people worldwide each year. Children between the ages of 3 and 11 years are particularly vulnerable because of their social behaviour (games etc.) which is favourable to the propagation of parasites.Although conventional anti-lice lotions are effective in a many cases, an ever increasing resistance to these treatments has been observed. Like many parasites, lice have evolved their own strategy for survival in difficult conditions. Through evolution of their genetic inheritance, they have become insensitive to the usual insecticides (malathion and pyrethrin) contained in the lotions. In the case of pyrethrin, mutations in the amino acids involved in the development of the sodium channels, acting at the central nervous system level of the lice, have been identified and are responsible for this resistance.The appearance of new forms of resistance seems to be constantly increasing and lice epidemics are becoming ever more difficult to treat and eradicate. Hence the necessity to find new therapeutic alternatives.

A multi-centre international study

Researchers from AP-HP and Inserm have therefore performed a clinical trial to compare the effectiveness of a new oral treatment (oral Ivermectin administered at 400 µg per kilogram) with that of a conventional anti-lice treatment (0.5% malathion lotion). The trial was conducted by applying one or other of the products twice, at an interval of seven days, to 812 contaminated individuals from 376 families.Ivermectin is a compound from the avermectin family which acts by blocking neurotransmissions in the brains of invertebrates.

The results obtained by the researchers are convincing: 95% of the 398 individuals who received Ivermectin were free from lice 15 days after the start of treatment, as compared to 85% of the 414 individuals treated with malathion. Ivermectin is already available on the market. It is prescribed, in particular, for treatment of scabies.

For Olivier Chosidow, coordinator of the study, no doubt remains, "When conventional treatments against lice do not work, taking Ivermectin twice, with a seven-day interval, offers excellent results and represents a real alternative to conventional anti-lice lotions."

Story Source:

Adapted from materials provided by INSERM (Institut national de la santé et de la recherche médicale), via EurekAlert!, a service of AAAS.

Journal Reference:

1. Chosidow, Olivier, Giraudeau, Bruno, Cottrell, Jeremy, Izri, Arezki, Hofmann, Robert, Mann, Stephen G., Burgess, Ian. **Oral Ivermectin versus Malathion Lotion for Difficult-to-Treat Head Lice**. *New England Journal of Medicine*, 2010; 362 (10): 896 DOI: 10.1056/NEJMoa0905471

http://www.sciencedaily.com/releases/2010/03/100311111737.htm

Computer System Helps Reduce Adverse Drug Side Effects and Interactions in ICU Patients

The electronic drug information system "AiDKlinik" was used in a study in an intensive care unit at Heidelberg University Hospital. (Credit: Heidelberg University Hospital)

ScienceDaily (Mar. 12, 2010) — To get life-threatening diseases under control, patients in the intensive care unit usually are administered many medications at the same time. Even for experts, it is difficult to keep track of the variety of possible side effects and interactions. The team headed by Dr. Thilo Bertsche, director of the cooperation unit for clinical pharmacy at Heidelberg University Hospital, has now shown that physicians can reduce serious events resulting from drug interactions by about half with the help of the "AiDKlinik" drug information system.

The results of the study were published in the journal *Intensive Care Medicine*.

One of the few effective drug information systems in the world

"We previously verifiably improved physician's prescriptions with our "AiDKlinik" tool and showed that no new errors were introduced. However, we have now proven that laboratory values and clinical findings are also changed. Not many systems in the world can maintain that they have been able to reduce clinically relevant events due to drug interactions by almost half," says Professor Dr. Walter E. Haefeli, Medical Director of the Department of Clinical Pharmacology and Pharmacoepidemiology at Heidelberg University Hospital.

Erroneous prescriptions, interactions not taken into account, contraindications, or restrictions on use are often the cause of avoidable adverse drug effects. The "AiDKlinik" drug information system developed at the hospital helps to reduce such undesired events. While the condition of patients in the ICU frequently requires that they be given certain drugs despite known interactions, the goal is to prevent clinically relevant events that could endanger the patients.

Half as many risk situations for ICU patients

Data from 265 patients were examined for the study in an intensive care unit at Heidelberg University Hospital. The study included only patients who were given eight or nine drugs simultaneously. On the second day after admission, the prescribed medication was checked using the drug information system. At the next rounds, the physicians responsible for the patient were given a report on potential drug interactions and, if necessary, concrete recommendations to avoid clinical effects.

Using this procedure, the adverse events in connection with drug interactions were reduced by 43 percent. Some of the most critical events, such as changes in the ECG and electrolyte imbalances, which can lead to severe arrhythmia, were reduced by 64 percent and 80 percent respectively. In addition, fewer patients needed additional drugs to treat side effects.

"AiDKlinik" -- a development from hospital practice

The "AiDKlinik" drug information system was developed in recent years by the Department of Clinical Pharmacology and Pharmacoepidemiology at Heidelberg University Hospital in conjunction with the hospital pharmacy and Medizinische Medien Informations GmbH (MMI, Neu-Isenburg) and has since been continuously expanded. It is an Internet-based electronic guideline that can be used by hospitals and practices. Numerous relevant patient data such as age, renal function, pregnancy, etc. are included in information processing. The information system currently includes around 64,000 drugs and is implemented in the entire university hospital. The information stems from the Pharmindex database, issued by the medical publishing house Medizinische Medien Informations GmbH and is updated every 14 days.

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Story Source:

Adapted from materials provided by University Hospital Heidelberg.

Journal Reference:

1. T Bertsche, J Pfaff, P Schiller, J Kaltschmidt, MG Pruszydlo, W Stremmel, I Walter-Sack, WE Haefeli, J Encke. **Prevention of adverse drug reactions in intensive care patients by personal intervention based on an electronic clinical decision support system**. *Intensive Care Medicine*, 2010; DOI: 10.1007/s00134-010-1778-8

http://www.sciencedaily.com/releases/2010/03/100310101720.htm

Neutropenia: Research Findings Expected to Ease Treatment of Low Neutrophil Counts in Cancer Patients

ScienceDaily (Mar. 12, 2010) — For patients like 10-year-old Sabrina Jo Spence, new research led by St. Jude Children's Research Hospital investigators meant fewer injections to combat the drop in white blood cells following her recent chemotherapy.

"Cool," Sabrina told Sheri Spunt, M.D., an associate member of the St. Jude Department of Oncology, after hearing the news and breaking into what Sabrina called her "happy dance." Sabrina is battling rhabdomyosarcoma.

Spunt is Sabrina's doctor and lead author of a study expected to transform how children like Sabrina are treated for neutropenia. Neutropenia is the dangerous drop in white blood cells that leaves cancer patients at increased risk for infections and can delay chemotherapy. The work appears in the March 10 edition of the *Journal of Clinical Oncology.*

In a study of 44 young cancer patients, investigators reported that the drugs pegfilgrastim and filgrastim were similarly safe and effective at restoring a safe level of neutrophils following chemotherapy. But pegfilgrastim treatment required a single injection, while filgrastim involved daily injections for a week or longer. The trial was a multicenter, randomized, open-label study to evaluate the safety and efficacy of the two drugs as well as how they are used and metabolized in the body.

"This study will make a big impact on the quality of life for patients and their families," Spunt said.

Both drugs are synthetic growth factors designed to stimulate production of neutrophils. Neutrophils are made in the bone marrow and protect against bacterial and fungal infections. They are often short-term casualties of chemotherapy. Filgrastim has been widely used to speed neutrophil recovery. Pegfilgrastim was developed as a longer-acting version of filgrastim. It is approved for use in adults.

Although the study focused on patients with sarcomas such as rhabdomyosarcoma and Ewing sarcoma, Spunt said the results will likely change neutropenia treatment for all childhood cancer patients. The study's participants ranged in age from 28 days to 21 years.

"A large percentage of childhood cancer patients get growth factor support during their therapy," Spunt explained. "The injections are painful for patients and difficult for parents, especially the parents of young children who often need two adults to administer the drug daily. The burdens of therapy for them are considerable."

Sabrina, who did not participate in this study, said she became accustomed to the daily shots administered by her grandmother, Alice Spence. But Sabrina always held tight to her mother's hand when the time came. She was happy when the daily injections were replaced by a single shot.

In the study, researchers reported that after the first round of chemotherapy with vincristine, doxorubicin and cyclophosphamide, neutrophil levels started to rise in half the patients five days after treatment with pegfilgrastim, compared with six days for the filgrastim group. By the third round of chemotherapy, which followed additional treatment with ifosfamide and etoposide, half the patients in both groups were improving in seven days.

Both pegfilgrastim and filgrastim are made by Amgen, a California-based pharmaceutical company. Filgrastim is metabolized in the kidneys. Pegfilgrastim includes a polyethylene glycol tail and is broken down by neutrophils. As a result, pegfilgrastim levels drop as the patient's neutrophils climb.

The other authors of this paper are Helen Irving (Royal Children's Hospital, Queensland, Australia); Jami Frost (Lovelace Health Plan, Albuquerque, N.M.), Leonard Sender (CHOC Children's Hospital, Orange, CA.), Matthew Guo, Bing-Bing Yang, Lyndah Dreiling (Amgen Inc.) and Victor Santana (St. Jude).

This work is supported in part by Amgen, the National Cancer Institute and ALSAC.

Story Source:

Adapted from materials provided by St. Jude Children's Research Hospital.

Journal Reference:

1. Sheri L. Spunt, Helen Irving, Jami Frost, Leonard Sender, Matthew Guo, Bing-Bing Yang, Lyndah Dreiling, and Victor M. Santana. **Phase II, Randomized, Open-Label Study of Pegfilgrastim-Supported VDC/IE Chemotherapy in Pediatric Sarcoma Patients**. *Journal of Clinical Oncology*, 2010; 28 (8): 1329 DOI: 10.1200/JCO.2009.24.8872

http://www.sciencedaily.com/releases/2010/03/100310113533.htm

New Study Debunks Myths About Vulnerability of Amazon Rain Forests to Drought

Canopy of the Amazon rain forest. A new study has concluded that Amazon rain forests were remarkably unaffected in the face of once-in-a-century drought in 2005, neither dying nor thriving, contrary to a previously published report and claims by the Intergovernmental Panel on Climate Change. (Credit: iStockphoto/Warwick Lister-Kaye)

ScienceDaily (Mar. 12, 2010) — A new NASA-funded study has concluded that Amazon rain forests were remarkably unaffected in the face of once-in-a-century drought in 2005, neither dying nor thriving, contrary to a previously published report and claims by the Intergovernmental Panel on Climate Change.

"We found no big differences in the greenness level of these forests between drought and non-drought years, which suggests that these forests may be more tolerant of droughts than we previously thought," said Arindam Samanta, the study's lead author from Boston University.

The comprehensive study published in the current issue of the scientific journal *Geophysical Research Letters* used the latest version of the NASA MODIS satellite data to measure the greenness of these vast pristine forests over the past decade.

A study published in the journal *Science* in 2007 claimed that these forests actually thrive from drought because of more sunshine under cloud-less skies typical of drought conditions. The new study found that those results were flawed and not reproducible.

"This new study brings some clarity to our muddled understanding of how these forests, with their rich source of biodiversity, would fare in the future in the face of twin pressures from logging and changing climate," said Boston University Prof. Ranga Myneni, senior author of the new study.

The IPCC is under scrutiny for various data inaccuracies, including its claim -- based on a flawed World Wildlife Fund study -- that up to 40% of the Amazonian forests could react drastically and be replaced by savannas from even a slight reduction in rainfall.

"Our results certainly do not indicate such extreme sensitivity to reductions in rainfall," said Sangram Ganguly, an author on the new study, from the Bay Area Environmental Research Institute affiliated with NASA Ames Research Center in California.

"The way that the WWF report calculated this 40% was totally wrong, while [the new] calculations are by far more reliable and correct," said Dr. Jose Marengo, a Brazilian National Institute for Space Research climate scientist and member of the IPCC.

Story Source:

Adapted from materials provided by Boston University Medical Center, via EurekAlert!, a service of AAAS.

Journal Reference:

1. Samanta et al. **Amazon forests did not green-up during the 2005 drought**. *Geophysical Research Letters*, 2010; 37 (5): L05401 DOI: 10.1029/2009GL042154

http://www.sciencedaily.com/releases/2010/03/100311175039.htm

Advance in Understanding Body's Natural Defenses

ScienceDaily (Mar. 12, 2010) — Medical Research Council (MRC) scientists at the University of Leicester have made a new advance in understanding how the body fights certain types of cancer and other disease such as Lupus and rheumatoid arthritis.

Their findings have been published in the journal *Nature Immunology*. The work has been carried out by a team at the MRC Toxicology Unit at the University of Leicester.

Dr Melania Capasso, one of the authors of the study, described the findings as being 'very significant'.

"We showed that a newly discovered protein, HVCN1, regulates antibody production through modulation of intracellular oxidation. In the absence of HVCN1, the immune response is blunted. These findings are very novel and significantly contribute to our understanding of how the organism mounts an immune response.

"The findings are very significant for the immunology field and help elucidate the contribution of natural oxidants such as reactive oxygen species to B cell activation and represent the rationale for using HVCN1 as a target for therapies where activation of B cell needs to be diminished."

Dr Capasso said the findings could be useful for the treatment of some types of B cell lymphoma and the treatment of autoimmune diseases such as Lupus (and rheumatoid arthritis).

Story Source:

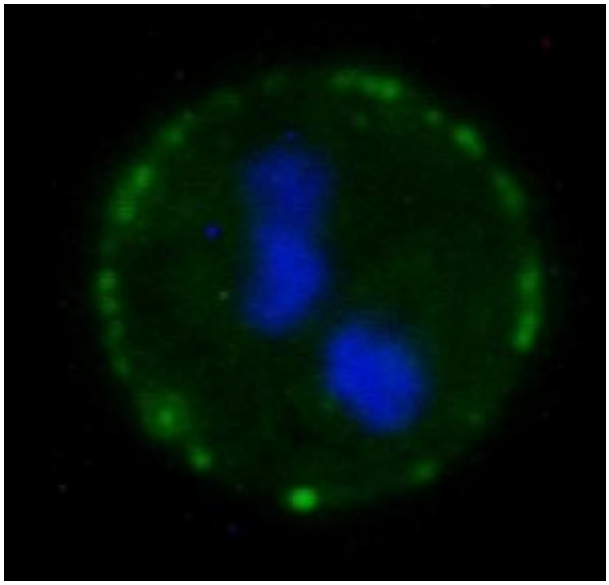
Adapted from materials provided by University of Leicester, via AlphaGalileo.

Journal Reference:

1. Capasso et al. **HVCN1 modulates BCR signal strength via regulation of BCR-dependent generation of reactive oxygen species**. *Nature Immunology*, 2010; 11 (3): 265 DOI: 10.1038/ni.1843

http://www.sciencedaily.com/releases/2010/03/100311092423.htm

Malaria in Pregnant Women: Step Towards a New Vaccine



P. falciparum parasitized erythrocytes. The var2CSA protein is colored green. (Credit: Copyright Benoit Gamain, CNRS/Institut Pasteur)

ScienceDaily (Mar. 12, 2010) — By managing to express the protein that enables red blood cells infected with the malaria agent *Plasmodium falciparum* to bind to the placenta and by deciphering its molecular mechanisms, a team of researchers from CNRS and the Institut Pasteur has taken an important first step in the development of a vaccine against pregnancy-associated malaria.

Their work was published in the journal *Proceedings of the National Academy of Sciences*.

In endemic areas where malaria is rife, the main victims are children less than three years old. This is because adults acquire, in the course of their lives, an immunity that protects them against the parasite. However, pregnant women, especially during a first pregnancy, have potentially fatal reactions to *P. falciparum*. The parasites also prevent exchanges of gases and nutrients through the placenta, thereby leading to spontaneous abortions, premature deliveries and newborn babies with too low birth weight, which are serious conditions in countries where infantile mortality is very high in the first year.

Following a bite by an infectious mosquito, the parasite first multiplies in the liver, before entering the bloodstream where it invades the erythrocytes (or red blood cells). The parasite then rapidly modifies the surface of its host erythrocyte with one of the sixty variable proteins of the PfEMP1 (*Plasmodium falciparum* Erythrocyte Membrane Protein 1) family. These proteins protect the parasite from the host's immune response and enable it to adhere to the host's cells. The severity of pregnancy-associated malaria (PAM) has been associated with the ability of parasitized erythrocytes to bind to a sugar present in the placenta, chondroitin sulfate A (CSA). After several pregnancies, women acquire protective antibodies that block CSA-binding.

One of the potential vaccination strategies for PAM is to recreate this protective immunity, by blocking the binding of parasitized erythrocytes to the placenta. Previous work carried out by the team headed by Benoît Gamain, CNRS researcher at the Unité Bases Génétiques et Moléculaires des Interactions de la Cellule Eucaryote (Institut Pasteur), has shown that one of the proteins of the PfEMP1 family, known as var2CSA, plays an important role in PAM. It is thus the prime target for a vaccine. However, the var2CSA protein shows considerable polymorphism, is very large and has a very complex structure.

These characteristics have, until now, prevented researchers from reproducing it in the laboratory and studying it to elucidate its structure and its action mechanisms. Only selected "chunks" of proteins involved in these binding areas, known as domains, have been synthesized.

Gamain and his colleagues have, for the first time, succeeded in producing the entire var2CSA protein for the purpose of studying it. This protein has shown specific, high-affinity binding to CSA, more than a thousand times greater than that of the simple domains synthesized previously. Therefore it is indeed a functional protein, with all the characteristics and functions of the var2CSA protein expressed at the surface of parasitized erythrocytes. Structural studies conducted in collaboration with researchers at EMBL (European Molecular Biology Laboratory) in Grenoble then made it possible to observe the structure of this protein. Var2CSA has a compact rather than a lengthened shape, as was assumed previously, and has a CSA-binding pocket that is most probably created when the protein folds upon itself.

For the researchers, these results constitute a first step in the race to develop vaccinal or therapeutic approaches aimed at protecting women during their first pregnancies as well as their unborn fetuses. Their work, conducted within the European "Premalstruct" consortium headed by Gamain, is now going to focus on the CSA-binding pocket, responsible for the adhesion of parasitized erythrocytes to the cells of the placenta.

Story Source:

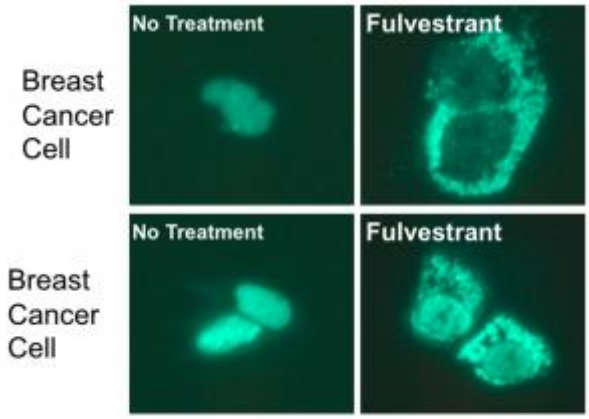
Adapted from materials provided by CNRS (Délégation Paris Michel-Ange).

Journal Reference:

1. Anand Srivastava, Stéphane Gangnard, Adam Round, Sébastien Dechavanne, Alexandre Juillerat, Bertrand Raynal, Grazyna Faure, Bruno Baron, Stéphanie Ramboarina, Saurabh Kumar Singh, Hassan Belrhali, Patrick England, Anita Lewit-Bentley, Artur Scherf, Graham A. Bentley, Benoît Gamain. **Full-length extracellular region of the var2CSA variant of PfEMP1 is required for specific, high-affinity binding to CSA**. *Proceedings of the National Academy of Sciences*, 2010; DOI: 10.1073/pnas.1000951107

http://www.sciencedaily.com/releases/2010/03/100309112025.htm

Breast Cancer Drug Fulvestrant Appears More Effective in the Presence of CK8 and CK18



The figures show that fulvestrant-mediated cytoplasmic localization of ER is associated with intermediate filament proteins CK8 and CK18. After treatment of MCF-7 and T47D cells (breast cancer cells) with fulvestrant, dramatic cytoplasmic localization of ER was observed. The results indicate that the presence of CK8 and CK18 is necessary for fulvestrant-induced cytoplasmic localization of ER, which keeps the receptor away from the nucleus where it could activate growth promoting genes. (Credit: Kenneth Nephew)

ScienceDaily (Mar. 12, 2010) — Women's responsiveness to the second-line breast cancer drug fulvestrant may depend on whether the cancer cells are expressing two key proteins, Indiana University Bloomington scientists report in this month's *Cancer Biology & Therapy*.

Fulvestrant appeared to exert maximum anti-cancer effects in vitro when cells produced normal or elevated quantities of the cytokeratins CK8 and CK18, structural proteins that help give the nucleus its shape.

For fulvestrant to work well, the cells must also be responsive to estrogen, and producing the estrogen receptor ER-alpha. ER-alpha's importance to fulvestrant's anti-estrogenic action had been established in previous reports. The present study confirms fulvestrant's binding relationship to ER-alpha, while also showing two other proteins, cytokeratins 8 and 18, can strongly enhance fulvestrant's anti-estrogenic activity. Testing for the presence of these three proteins, and perhaps many others, could help doctors decide whether fulvestrant should be prescribed to their patients.

"We need an effective panel of markers that inform physicians about what treatment options will be most beneficial to patients," said Medical Sciences Program Bloomington cancer biologist Kenneth Nephew, who led the study. "These three gene products should be investigated further to determine whether they should be included in that panel."

Medical Sciences Program Bloomington is a division of the IU School of Medicine. Nephew is a professor of cellular and integrative physiology, and obstetrics and gynecology.

"Normal" breast cancer cells can grow faster in the presence of estrogen, a hormone. Estrogen attaches to receptors embedded in the cancer cell, such as ER-alpha in the cytoplasm and nucleus. The estrogen-ER complex can then act to turn on genes or amplify their expression. Not all cancer cells are responsive to estrogen, however, or to fulvestrant, which counteracts estrogen's effects.

Although fulvestrant has been used to treat cancer since the late 1980s, and is now commonly prescribed as a second-line defense against metastatic cancer cells, how the drug works is still not completely understood. Nephew said one of the aims of the research is to clarify fulvestrant's biochemistry, and understand why cancer cells eventually become unresponsive to the drug.

Second-line breast cancer therapies are employed when first-line approaches (tamoxifen, for example) don't work or stop working.

After conducting analyses of different cell lines and assaying gene and protein activity, Nephew, Xinghua Long (now a faculty member at Jiangnan University), and Meiyun Fan (now an assistant professor at the University of Tennessee-Memphis) believe they are able to present a compelling model for fulvestrant's action. The scientists believe that when fulvestrant encounters ER-alpha and binds to the receptor, the receptor forms a two-protein complex either with another ER-alpha -- or with ER-beta, a related but different estrogen receptor. The alpha-alpha or alpha-beta "dimer" is then removed to the nuclear matrix, where it binds to CK8 and CK18. It's the binding of ER-alpha to the nuclear matrix that would seem to signal protein-killing proteases to destroy ER-alpha. As the number of available estrogen receptors plummets, the connection between estrogen and cancer-related gene activity is weakened, and estrogen can no longer contribute to the growth of cancer cells.

Because many drug treatments can have a severely negative impact on quality of life, Nephew said fulvestrant and other cancer drugs should only be prescribed when their use is associated with a reasonable chance of successful outcomes. However, compared to frequently prescribed endocrine treatments for advanced disease like tamoxifen, anastrozole, letrozole and exemestane, fulvestrant is well tolerated. If biopsied cancer cells can be shown beforehand to be resistant or unresponsive to fulvestrant, the doctor may prevent some of the commonly reported side effects seen with the drug.

Nephew said that it wouldn't be easy for physicians to simply order a separate test that analyzes biopsied tissue for the presence of CK8 and CK18.

"It would require a few things a typical hospital doesn't have on hand," Nephew said. "But we're currently investigating how to do that. We also need to be able to show that the expression of the two cytokeratins can be prognostic of fulvestrant's effectiveness. To that end we are talking with George Sledge at the Indianapolis campus about the feasibility of clinical studies. That would be the next step."

George Sledge Jr. is the Ballve-Lantero Professor of Hematology/Oncology at the IU School of Medicine's Melvin and Bren Simon Cancer Center.

When the study was conducted, report coauthors Xinghua Long and Meiyun Fan were at IU Bloomington as a Ph.D. student and a postdoctoral fellow, respectively. The research was funded with grants from the National Cancer Institute's Integrative Cancer Biology Program, the Walther Cancer Foundation, and the National Natural Science Foundation of China.

Story Source:

Adapted from materials provided by Indiana University.

Journal Reference:

1. Xinghua Long, Meiyun Fan and Kenneth P. Nephew. **Estrogen receptor-alpha-interacting cytokeratins potentiate the antiestrogenic activity of fulvestrant**. *Cancer Biology & Therapy*, 2010; 9 (5): 43-50 [link]

http://www.sciencedaily.com/releases/2010/03/100310101724.htm

How a Romantic Breakup Affects Self-Concept

ScienceDaily (Mar. 12, 2010) — When a romantic relationship ends, an individual's self-concept is vulnerable to change, according to research in the February issue of *Personality and Social Psychology Bulletin.*

Self-concept is defined as a person's sense of "me." Romantic partners develop shared friends, activities and even overlapping self-concepts.

Using three studies, the researchers examined self-concept changes that can occur after a breakup. They found that individuals have reduced self-concept clarity after a breakup. This reduced clarity can contribute to emotional distress. The loss of the relationship has multiple psychological consequences, including the tendency for individuals to change the content of their selves and the feeling that their selves are subjectively less clear and even smaller.

Finding that there is a prevalence of self-change experienced when a romantic relationship ends provides a testament to the power of loss that impacts one's sense of self.

"Not only may couples come to complete each others' sentences, they may actually come to complete each others' selves," write authors Erica B. Slotter, Wendi L. Gardner, and Eli J. Finkel. "When the relationship ends, individuals experience not only pain over the loss of the partner, but also changes in their selves. This research is the first to demonstrate the unique contribution of reduced self-concept clarity to the emotional distress that individuals experience post-breakup."

Story Source:

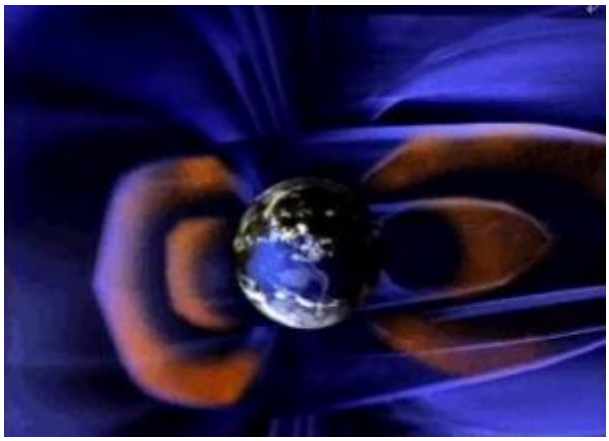
Adapted from materials provided by SAGE Publications, via EurekAlert!, a service of AAAS.

Journal Reference:

1. Slotter et al. **Who Am I Without You? The Influence of Romantic Breakup on the Self-Concept**. *Personality and Social Psychology Bulletin*, 2010; 36 (2): 147 DOI: 10.1177/0146167209352250

http://www.sciencedaily.com/releases/2010/03/100308132139.htm

Shocking Recipe for Making Killer Electrons



Earth's magnetosphere and radiation belts. (Credit: ESA)

ScienceDaily (Mar. 11, 2010) — Take a bunch of fast-moving electrons, place them in orbit and then hit them with the shock waves from a solar storm. What do you get? Killer electrons. That's the shocking recipe revealed by ESA's Cluster mission.

Killer electrons are highly energetic particles trapped in Earth's outer radiation belt, which extends from 12 000 km to 64 000 km above the planet's surface. During solar storms their number grows at least ten times and they can be dislodged, posing a threat to satellites. As the name suggests, killer electrons are energetic enough to penetrate satellite shielding and cause microscopic lightning strikes. If these electrical discharges take place in vital components, the satellite can be damaged or even rendered inoperable.

On 7 November 2004, the Sun blasted a solar storm in Earth's direction. It was composed of an interplanetary shock wave followed by a large magnetic cloud. When the shock wave first swept over the ESA-NASA solar watchdog satellite SOHO, the speed of the solar wind (the constant flow of solar particles) suddenly increased from 500 km/s to 700 km/s.

Shortly afterwards, the shock wave hit Earth's protective magnetic bubble, known as the magnetosphere. The impact induced a wave front propagating inside the magnetosphere at more than 1200 km/s at geostationary orbit (36 000 km altitude) around Earth. The quantity of energetic electrons in the outer radiation belt started to increase too, according to Cluster's RAPID instruments (Research with Adaptive Particle Imaging Detectors). Cluster's four satellites sweep around an elliptical orbit, coming as close as 19 000 km and going out as far as 119 000 km.

Understanding the origin of the killer electrons has been a focus for space weather researchers. Thanks to previous data collected by Cluster and other space missions, scientists proposed two methods by which electrons can be accelerated to such harmful energy levels. One relies on very low frequency (VLF) waves of 3-30 kHz, the other on ultra low frequency (ULF) waves of 0.001-1 Hz. This latest work disentangles the problem.

Which waves are responsible? Both of them. "Both VLF and ULF waves accelerate electrons in Earth's radiation belts, but with different timescales. The ULF waves are much faster than the VLF, due to their much larger amplitudes," says Qiugang Zong from Peking University (China) and University of Massachusetts Lowell (USA), lead author of the paper describing this result.

The data show that a two-step process causes the substantial rise of killer electrons. The initial acceleration is due to the strong shock-related magnetic field compression. Immediately after the impact of the interplanetary shock, Earth's magnetic field lines began wobbling at ultra low frequencies. In turn,

these ULF waves were found to effectively accelerate the seed electrons provided by the first step, to become killer electrons.

Although the analysis has been a long one, the results have been worth the wait. Now astronomers know how killer electrons are accelerated. "Data from the four Cluster satellites allowed the identification of ULF waves able to accelerate electrons," says Malcolm Dunlop, Rutherford Appleton Laboratory, Didcot (UK) and co-author of this study.

Thanks to this analysis of Cluster data, if the killer electrons happen to be ejected towards Earth, we now know that they can strike the atmosphere within just 15 minutes. "These new findings help us to improve the models predicting the radiation environment in which satellites and astronauts operate. With solar activity now ramping up, we expect more of these shocks to impact our magnetosphere over the months and years to come," says Philippe Escoubet, ESA's Cluster mission manager.

Story Source:

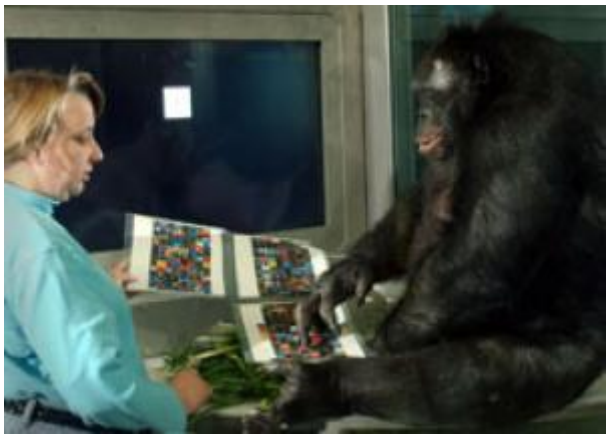
Adapted from materials provided by European Space Agency.

Journal Reference:

1. Zong et al. **Energetic electron response to ULF waves induced by interplanetary shocks in the outer radiation belt**. *Journal of Geophysical Research*, 2009; 114 (a10): A10204 DOI: 10.1029/2009JA014393

http://www.sciencedaily.com/releases/2010/03/100311101659.htm

If Bonobo Kanzi Can Point as Humans Do, What Other Similarities Can Rearing Reveal?



Kanzi, shown with Great Ape Trust researcher Liz Rubert-Pugh, routinely points to lexigram symbols to express his thoughts. He also points in response to conversation, as a human would, a topic addressed in a paper on pointing behavior by Great Ape Trust scientists. (Credit: Great Ape Trust photo)

ScienceDaily (Mar. 11, 2010) — You may have more in common with Kanzi, Panbanisha and Nyota, three language-competent bonobos living at Great Ape Trust, than you thought. And those similarities, right at your fingertip, might one day tell scientists more about the effect of culture on neurological disorders that limit human expression.

Among humans, pointing is a universal language, an alternative to spoken words to convey a message. Before they speak, infants point, a gesture scientists agree is closely associated with word learning. But when an ape points, scientists break rank on the question of whether pointing is a uniquely human behavior. Some of the world's leading voices in modern primatology have argued that although apes may gesture in a way that resembles human pointing, the genetic and cognitive differences between apes and humans are so great that the apes' signals have no specific intent.

Not so, say Great Ape Trust scientists, who argued in a recently published scientific paper, "Why Apes Point: Pointing Gestures in Spontaneous Conversation of Language-Competent Pan/Homo Bonobos," that not only do Kanzi, Panbanisha and Nyota point with their index fingers in conversation as a human being might, these bonobos do so with specific intent and objectives in mind.

The difference between pointing by the Great Ape Trust bonobos -- the only ones in the world with receptive competence for spoken English -- and other captive apes that make hand gestures is explained by the culture in which they were reared, according to the paper's authors: Janni Pedersen, an Iowa State University Ph.D. candidate conducting research for her dissertation at Great Ape Trust; Pär Segerdahl, a scientist from Sweden who has published several philosophical inquires into language; and William M. Fields, an ethnographer investigating language, culture and tools in non-human primates. Fields also is Great Ape Trust's director of scientific research.

Because Kanzi, Panbanisha and Nyota were raised in a culture where pointing has a purpose -- The Trust's hallmark Pan/Homo environment, where infant bonobos are reared with both bonobo (*Pan paniscus*) and human (*Homo sapiens*) influences -- their pointing is as scientifically meaningful as their understanding of spoken English, Fields said.

The pointing study supports and builds on previous research on the effect of rearing culture on cognitive capabilities, including the 40-year research corpus of Dr. Duane Rumbaugh, Dr. Sue Savage-Rumbaugh and Fields, which is the foundation of the scientific inquiry at Great Ape Trust. Those studies included the breakthrough finding that Kanzi and other bonobos with receptive competence for spoken English acquired language as human children do -- by being exposed to it since infancy. The bonobos adopted

finger-pointing behavior for the same reasons, because they were reared in a culture where pointing has meaning.

"We have argued that apes and humans, while very closely related genetically, differ most dramatically in culture," Fields said. "Pointing is a function of culture. If Kanzi can do the kinds of things that he is able to do as a function of rearing, what does that mean for humans?"

Fields said studying the effect of culture on great apes' cognitive capabilities might help scientists learn more about human disorders that cause developmental delays. "This opens the entire question of how you push the limits of genes by cultural forces, for instance in Down's Syndrome or other genetic variations that limit normal human expression," he said. "What is the role of culture as a mitigating strategy for Autistic Spectrum Disorders? Is IQ a function of culture?"

Answering those questions brings scientists a step closer to determining the role of epigenesis -- the influence of the environment on the expression of the genetic code -- in a variety of disciplines, including medicine, education and technology.

The Great Ape Trust scientists conducted the study in rebuttal to a paper written by Michael Tomasello, a leading expert on evolution and communication. Tomasello, co-director of the Max Planck Institute for Evolutionary Anthropology in Germany, asserted in "Why Apes Don't Point" that though captive apes may appear to point, the genetic and cognitive differences between apes and humans are so great that there is no specific intent behind the gesture.

Pedersen *et al.* argued that an ape that was not reared in a culture where index finger pointing was common, including most captive apes, would not be expected to exhibit that gesture. The scientists also noted that although pointing isn't a behavior that wild bonobos and other great apes acquire on their own, it does not mean that they are genetically or cognitively incapable of learning the behavior.

"Tomasello's argument rests upon questionable empirical evidence," Pedersen and her colleagues wrote, "since the apes in the referred experimental studies have not been relevantly reared. By providing evidence that language-encultured apes do point, the assumptions about the cognitive differences between humans and apes need to be called into question on both theoretical and empirical ground."

A chapter based on the Great Ape Trust scientists' study is included in *Primatology: Theories, Methods and Research*, published by Nova Science Publishers Inc. and edited by Emil Potocki and Juliusz Krasinski (see: https://www.novapublishers.com/catalog/product_info.php?cPath=23_29&products_id=10334&osCsid=194253516d33b486c6cfe95f66e106f8).

Pedersen also presented the findings of the study at the meeting of the American Society of Primatologists in San Diego last September. She is expected to receive her Ph.D. in ecology and evolutionary biology later this year.

Story Source:

Adapted from materials provided by Great Ape Trust of Iowa.

http://www.sciencedaily.com/releases/2010/03/100301131907.htm

Inventing New Oat and Barley Breads

All-oat or all-barley breads that ARS scientists are developing may offer a different array of vitamins, antioxidants, fiber, protein, and other healthful components than that in whole-wheat breads. (Credit: Photo by Peggy Greb.)

ScienceDaily (Mar. 11, 2010) — Delicious new all-oat or all-barley breads might result from laboratory experiments now being conducted by Agricultural Research Service (ARS) scientists in California.

Research chemist Wallace Yokoyama and postdoctoral nutritionist Hyunsook Kim want to develop new and tasty whole-grain oat or barley breads that offer antioxidants, fiber, and other components in an array different from that found in today's whole-wheat breads. The researchers work at the ARS Western Regional Research Center in Albany, Calif.

In preliminary experiments, Yokoyama, Kim and their colleagues made experimental all-oat or all-barley breads, as well as whole-wheat breads, using a commercially available, plant-derived carbohydrate known as HPMC (short for hydroxypropyl methylcellulose). They are interested in HPMC as a substitute for gluten, a compound present in wheat but lacking in other grains such as oats and barley.

Gluten traps the airy bubbles formed by yeast, lifting doughs to form high, attractive, nicely textured loaves. But HPMC can perform that essential biochemical chore, too. That was shown many years ago in research with rice flour, conducted by now-retired Albany scientist Maura M. Bean.

Yokoyama and Kim determined that barley, oat, and whole-wheat breads made with HPMC had cholesterol-lowering effects. They found this in tests with laboratory hamsters that were fed a high-fat diet and the experimental breads.

The HPMC that the scientists are investigating is derived from a plant source proprietary to manufacturer Dow Wolff Cellulosics of Midland, Mich. Though this HPMC is widely used in familiar foods -- as a thickener, for instance -- its cholesterol-lowering properties as an ingredient in whole-grain breads haven't been widely studied, Yokoyama reported.

Story Source:

Adapted from materials provided by USDA/Agricultural Research Service

http://www.sciencedaily.com/releases/2010/02/100228095545.htm

Scientists Solve Puzzle of Chickens That Are Half Male and Half Female

Half-male, half-female chicken's mirror reflections. (Credit: The Roslin Institute, University of Edinburgh)

ScienceDaily (Mar. 11, 2010) — A puzzle that has baffled scientists for centuries -- why some birds appear to be male on one side of the body and female on the other -- has been solved by researchers.

The research, which involved studying rare naturally occurring chickens with white (male) plumage on one side and brown (female) plumage on the other, sheds new light on the sexual development of birds.

It was previously thought that sex chromosomes in birds control whether a testis or ovary forms, with sexual traits then being determined by hormones.

The researchers, however, identified differences between male and female cells that control the development of sexual traits. The scientists have named the phenomenon, cell autonomous sex identity (CASI).

The study from The Roslin Institute at the University of Edinburgh, which receives key funding from the Biotechnology and Biological Sciences Research Council, is published in the journal *Nature*.

The findings, which are scientifically revolutionary in the field, may also be relevant to why males and females differ in behaviour and in susceptibility to disease.

They could also lead to improvements in poultry production -- identification of some of the molecular differences between male and female cells should lead to better tests for sexing embryos prior to hatch. It might even be possible to devise ways of obtaining the growth characteristics of male birds in females, with improvements in feed efficiency and productivity that could contribute to future food security.

Dr Michael Clinton, who led the study, said: "This research has completely overturned what we previously thought about how sexual characteristics were determined in birds. We now believe that the major factors determining sexual development are built into male and female cells and derive from basic differences in how sex chromosome genes are expressed. Our study opens a new avenue for our understanding of sexual development in birds.

"It also means we must now reassess how this developmental process occurs in other organisms. There is already some evidence that organs such as the heart and brain are intrinsically different in males and females and birds may provide a model for understanding the molecular basis for these gender differences."

The group will now study the molecular mechanisms underlying the differences between male and female cells with a £800,000 grant from the Biotechnology and Biological Sciences Research Council (BBSRC), the UK's leading biosciences agency.

Story Source:

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

Journal Reference:

1. D. Zhao, D. McBride, S. Nandi, H. A. McQueen, M. J. McGrew, P. M. Hocking, P. D. Lewis, H. M. Sang & M. Clinton. **Somatic sex identity is cell autonomous in the chicken**. *Nature*, 2010; 464 (7286): 237 DOI: 10.1038/nature08852

http://www.sciencedaily.com/releases/2010/03/100310134156.htm

Years of Smoking Associated With Lower Parkinson's Risk, Not Number of Cigarettes Per Day

ScienceDaily (Mar. 11, 2010) — Researchers have new insight into the relationship between Parkinson's disease and smoking. Several studies have shown that smokers have a lower risk of developing Parkinson's disease. A new study published in the March 10, 2010, online issue of *Neurology*®, the medical journal of the American Academy of Neurology, shows that smoking for a greater number of years may reduce the risk of the disease, but smoking a larger number of cigarettes per day may not reduce the risk.

"These results could guide the development of studies on various tobacco components with animal models to help understand the relationship between smoking and Parkinson's disease," said study author Honglei Chen, MD, PhD, of the National Institute of Environmental Health Sciences in Research Triangle Park, N.C. "Research to reveal the underlying chemicals and mechanisms is warranted; such studies may lead to a better understanding of the causes of Parkinson's disease. However, given the many adverse consequences of smoking, no one would suggest smoking in order to prevent Parkinson's disease."

The study involved 305,468 AARP members age 50 to 71 who completed a survey on diet and lifestyle at the time and again about 10 years later. During that time, 1,662 of the people had developed Parkinson's disease, or about one-half of one percent.

Current smokers were 44 percent less likely to develop Parkinson's disease than people who had never smoked. People who had smoked in the past and quit were 22 percent less likely to develop Parkinson's than people who had never smoked.

People who smoked for 40 or more years were 46 percent less likely to develop Parkinson's disease than people who never smoked. Those who smoked for 30 to 39 years were 35 percent less likely to have the disease than nonsmokers. In contrast, those who smoked for one to nine years were only eight percent less likely to get the disease.

The risk of developing Parkinson's disease did not change based on how many cigarettes a person smoked per day.

Chen noted that studies have shown that smoking is not associated with a slower progression of the disease once Parkinson's develops or a reduced risk of death, so he said there is no evidence to support the use of nicotine or other smoking-related chemicals in treating the disease.

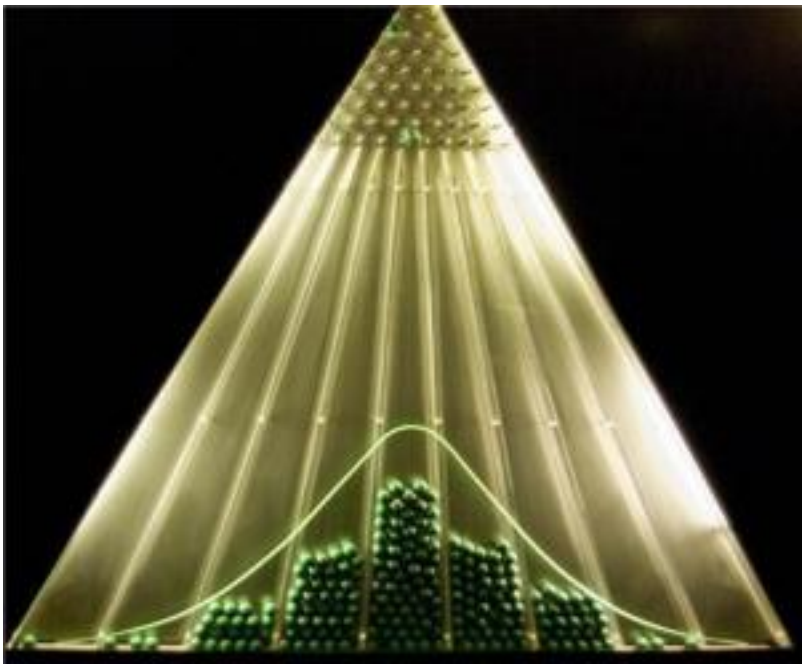
The study was supported by the National Institutes of Health, the National Institute of Environmental Health Sciences and the National Cancer Institute.

Story Source:

Adapted from materials provided by American Academy of Neurology.

http://www.sciencedaily.com/releases/2010/03/100310162823.htm

Physicists Take Atoms for a Quantum Walk



An example of a random walk is the Galton board, which is used to demonstrate binomial distribution to students. On this board, balls are dropped from the top and they repeatedly bounce either left or right in a random way as they hit pins stuck in the board. (Credit: Photo by Antoine Taveneaux)

ScienceDaily (Mar. 11, 2010) — A team of physicists, headed by Christian Roos and Rainer Blatt from the Institute of Quantum Optics and Quantum Information of the Austrian Academy of Sciences, has a achieved a quantum walk in a quantum system with up to 23 steps. It is the first time that this quantum process using trapped ions has been demonstrated in detail.

When a hiker comes to a junction he or she has to decide which way to take. All of these decisions, eventually, lead the hiker to the intended destination. When the hiker forgot the map, he or she has to make a decision randomly and gets to the destination with more or less detours. This is called a random walk and can regularly be encountered in mathematics and physics.

In 1827, for example, the Scottish botanist Robert Brown found out that pollen grains show irregular fluttering vibrations on water drops. This effect is caused by a random motion of water molecules -- a phenomenon known as Brownian motion. Another example is the Galton board, which is used to demonstrate binomial distribution to students. On this board, balls are dropped from the top and they repeatedly bounce either left or right in a random way as they hit pins stuck in the board.

Atom takes a "quantum walk"

The Innsbruck scientists have now transferred this principle of random walk to quantum systems and stimulated an atom taking a quantum walk: "We trap a single atom in an electromagnetic ion trap and cool it to prepare it in the ground state," explains Christian Roos from the Institute of Quantum Optics and Quantum Information (IQOQI). "We then create a quantum mechanical superposition of two inner states and send the atom on a walk."

The two internal states correspond to the decision of the hiker to go left or right. However, unlike the hiker the atom does not really have to decide where to go; due to the superposition of the two states, both possibilities are presented at the same time. "Depending on the internal state, we shift the ion to the right

or to the left," explains Christian Roos. "Thereby, the motional and internal state of the ion are entangled."

After each step the experimental physicists modify the superposition of the inner states by a laser pulse and again shift the ion to the left or right. The physicists can repeat this randomly controlled process up to 23 times, while collecting data about how quantum walks work. By using a second ion, the scientists extend the experiment, giving the walking ion the additional possibility to stay instead of moving to the right or left.

Better understanding of natural phenomena

The statistical analysis of these numerous steps confirms that quantum walks differ from classical (random) walks. While, for example, the balls of a Galton board move away from the starting point statistically very slowly, quantum particles spread much faster on their walk.

These experiments -- which have also been carried out in a similar way in Bonn, Munich and Erlangen with atoms, ions and photons -- can be applied to studying natural phenomena. For example, researchers suspect that the energy transport in plants works more efficiently because of quantum walks than would be the case with classical walks. In addition, a regime of quantum walk is of importance for developing a quantum computer model, which could solve ubiquitous problems. For example, applying quantum walks in such a model would help in finding search quantum algorithms that outperform their classical counterparts as different directions could be chosen simultaneously.

The scientists' experiment is supported by the Austrian Science Fund (FWF) and the European Commission.

Story Source:

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

Journal Reference:

1. Zähringer F, Kirchmair G, Gerritsma R, Solano E, Blatt R, Roos CF. **Realization of a Quantum Walk with One and Two Trapped Ions**. *Physical Review Letters*, 2010; 104 (10): 100503 DOI: 10.1103/PhysRevLett.104.100503

http://www.sciencedaily.com/releases/2010/03/100310083836.htm

World Crude Oil Production May Peak a Decade Earlier Than Some Predict

ScienceDaily (Mar. 11, 2010) — In a finding that may speed efforts to conserve oil and intensify the search for alternative fuel sources, scientists in Kuwait predict that world conventional crude oil production will peak in 2014 -- almost a decade earlier than some other predictions. Their study is in ACS' *Energy & Fuels.*

Ibrahim Nashawi and colleagues point out that rapid growth in global oil consumption has sparked a growing interest in predicting "peak oil" -- the point where oil production reaches a maximum and then declines. Scientists have developed several models to forecast this point, and some put the date at 2020 or later. One of the most famous forecast models, called the Hubbert model, accurately predicted that oil production would peak in the United States in 1970. The model has since gained in popularity and has been used to forecast oil production worldwide. However, recent studies show that the model is insufficient to account for more complex oil production cycles of some countries. Those cycles can be heavily influenced by technology changes, politics, and other factors, the scientists say.

The new study describe development of a new version of the Hubbert model that accounts for these individual production trends to provide a more realistic and accurate oil production forecast. Using the new model, the scientists evaluated the oil production trends of 47 major oil-producing countries, which supply most of the world's conventional crude oil. They estimated that worldwide conventional crude oil production will peak in 2014, years earlier than anticipated. The scientists also showed that the world's oil reserves are being depleted at a rate of 2.1 percent a year. The new model could help inform energy-related decisions and public policy debate, they suggest.

Story Source:

Adapted from materials provided by American Chemical Society, via EurekAlert!, a service of AAAS.

Journal Reference:

1. Nashawi et al. **Forecasting World Crude Oil Production Using Multicyclic Hubbert Model**. *Energy & Fuels*, 2010; 100204085653081 DOI: 10.1021/ef901240p

http://www.sciencedaily.com/releases/2010/03/100310134255.htm

Computer Algorithm Able to 'Read' Memories

To explore how memories are recorded, researchers showed volunteers three short films and asked them to memorize what they saw. The films were very simple, sharing a number of similar features -- all included a woman carrying out an everyday task in a typical urban street, and each film was the same length, seven seconds long. For example, one film showed a woman posting a letter. (Credit: Wellcome Trust Centre for Neuroimaging at UCL)

ScienceDaily (Mar. 11, 2010) — Computer programs have been able to predict which of three short films a person is thinking about, just by looking at their brain activity. The research, conducted by scientists at the Wellcome Trust Centre for Neuroimaging at UCL (University College London), provides further insight into how our memories are recorded.

Professor Eleanor Maguire led this Wellcome Trust-funded study, an extension of work published last year which showed how spatial memories -- in that case, where a volunteer was standing in a virtual reality room -- are recorded in regular patterns of activity in the hippocampus, the area of the brain responsible for learning and memory.

"In our previous experiment, we were looking at basic memories, at someone's location in an environment," says Professor Maguire. "What is more interesting is to look at 'episodic' memories -- the complex, everyday memories that include much more information on where we are, what we are doing and how we feel."

To explore how such memories are recorded, the researchers showed ten volunteers three short films and asked them to memorise what they saw. The films were very simple, sharing a number of similar features -- all included a woman carrying out an everyday task in a typical urban street, and each film was the same length, seven seconds long. For example, one film showed a woman drinking coffee from a paper

cup in the street before discarding the cup in a litter bin; another film showed a (different) woman posting a letter.

The volunteers were then asked to recall each of the films in turn whilst inside an fMRI scanner, which records brain activity by measuring changes in blood flow within the brain.

A computer algorithm then studied the patterns and had to identify which film the volunteer was recalling purely by looking at the pattern of their brain activity. The results are published in the journal *Current Biology*.

"The algorithm was able to predict correctly which of the three films the volunteer was recalling significantly above what would be expected by chance," explains Martin Chadwick, lead author of the study. "This suggests that our memories are recorded in a regular pattern."

Although a whole network of brain areas support memory, the researchers focused their study on the medial temporal lobe, an area deep within the brain believed to be most heavily involved in episodic memory. It includes the hippocampus -- an area which Professor Maguire and colleagues have studied extensively in the past.

They found that the key areas involved in recording the memories were the hippocampus and its immediate neighbours. However, the computer algorithm performed best when analysing activity in the hippocampus itself, suggesting that this is the most important region for recording episodic memories. In particular, three areas of the hippocampus -- the rear right and the front left and front right areas -- seemed to be involved consistently across all participants. The rear right area had been implicated in the earlier study, further enforcing the idea that this is where spatial information is recorded. However, it is still not clear what role the front two regions play.

"Now that we are developing a clearer picture of how our memories are stored, we hope to examine how they are affected by time, the ageing process and by brain injury," says Professor Maguire.

Story Source:

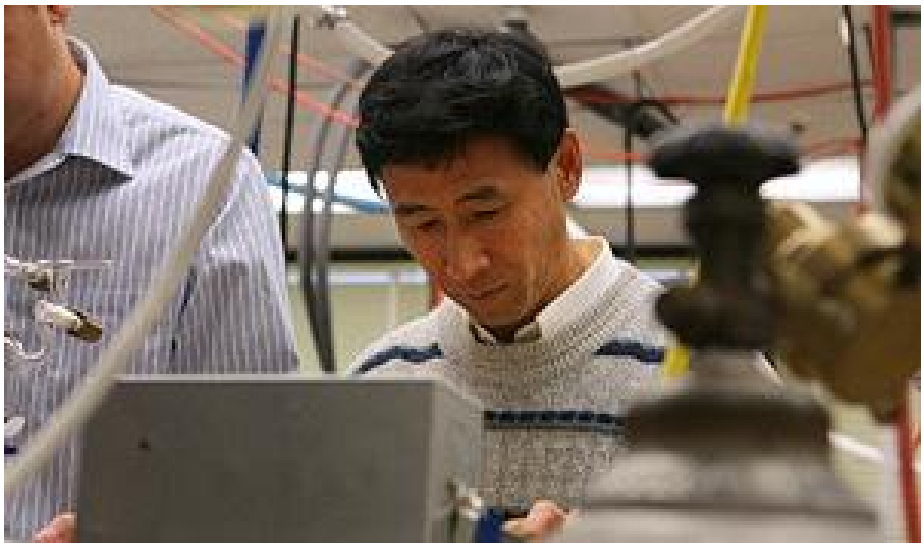
Adapted from materials provided by Wellcome Trust, via EurekAlert!, a service of AAAS.

Journal Reference:

1. Martin J. Chadwick, Demis Hassabis, Nikolaus Weiskopf, and Eleanor A. Maguire. **Decoding Individual Episodic Memory Traces in the Human Hippocampus**. *Current Biology*, 2010; DOI: 10.1016/j.cub.2010.01.053

http://www.sciencedaily.com/releases/2010/03/100311123520.htm

Atmospheric Nanoparticles Impact Health, Weather Professor Says



Renyi Zhang. (Credit: Image courtesy of Texas A&M University)

ScienceDaily (Mar. 11, 2010) — Nanoparticles are atmospheric materials so small that they can't be seen with the naked eye, but they can very visibly affect both weather patterns and human health all over the world -- and not in a good way, according to a study by a team of researchers at Texas A&M University.

Researchers Renyi Zhang, Alexei Khalizov, Jun Zheng, Wen Xu, Yan Ma and Vinita Lal in the Departments of Atmospheric Sciences and Chemistry say that nanoparticles appear to be growing in many parts of the world, but how they do so remains a mystery.

Their work is published in the current issue of *Nature Geoscience* and was funded by the National Science Foundation and The Welch Foundation.

The team looked at how nanoparticles are formed and their relationship with certain organic vapors responsible for additional growth.

"This is one of the most poorly understood of all atmospheric processes," Zhang says. "But we found that certain types of organics tend to grow very rapidly. When this happens, they scatter light back into space, and that definitely has a cooling effect -- sort of a reverse 'greenhouse effect.' It can alter Earth's weather patterns and it also tends to have a negative effect on human health."

Persons with breathing problems, such as those who suffer from asthma, emphysema or other lung ailments, can be at risk, he notes.

Zhang says the team used new methods of measuring nanoparticles and formed new models to determine their impact on atmospheric conditions.

"These changes on our weather systems appear to be the most dramatic consequences of these nanoparticles," he adds.

"Once these form, they can change cloud formations, which in turn can affect weather all over the world, so this can become a global problem to deal with. We're trying to get a better understanding of these particles work and grow.

"They can form near areas that have petrochemical plants, such as Houston, which also has high amounts of aerosols from traffic emissions and other numerous factories. But we're still trying to learn how they form and interact with the atmosphere."

Many types of trees and plants also contribute to the formation of nanoparticles, which are natural processes, Zhang says, and certain forms of organic materials can also speed up the development of the particles. But all of these ultimately affect the atmosphere, and very often, cloud formation, where the aerosols scatter light and radiation back into space and provide the "seeds" of cloud droplets and development.

"These nanoparticles are very small -- about one million times smaller than a typical raindrop," Zhang says. "But what they do can have a huge effect on our weather."

Story Source:

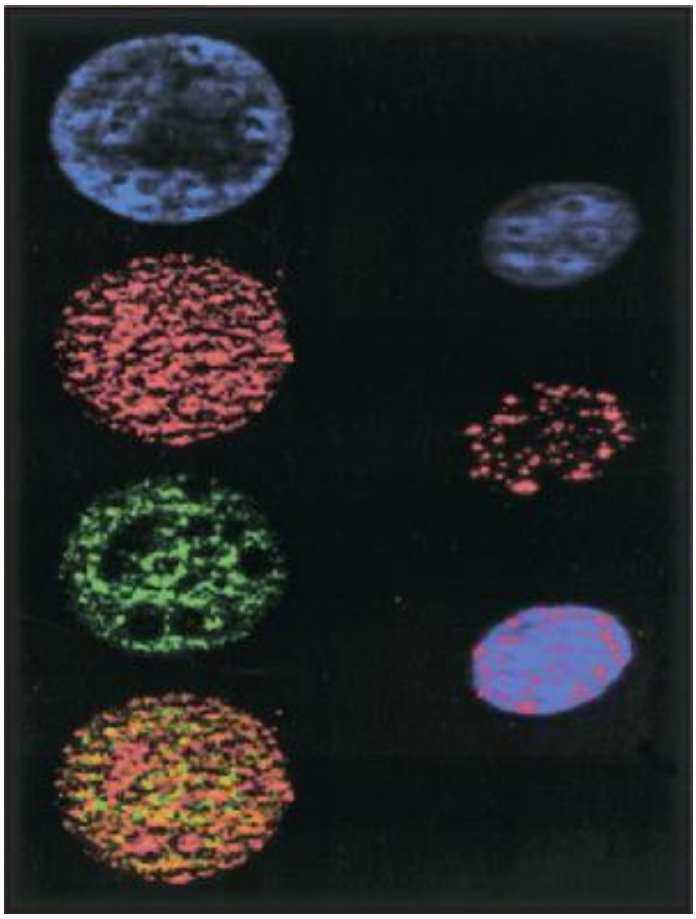
Adapted from materials provided by Texas A&M University.

Journal Reference:

1. Lin Wang, Alexei F. Khalizov, Jun Zheng, Wen Xu, Yan Ma, Vinita Lal & Renyi Zhang. **Atmospheric nanoparticles formed from heterogeneous reactions of organics**. *Nature Geoscience*, 2010; DOI: 10.1038/ngeo778

http://www.sciencedaily.com/releases/2010/03/100301102753.htm

Scientists Make Important Discovery in Gene Regulation



Proteins at work. (Credit: Image courtesy of University of Essex)

ScienceDaily (Mar. 11, 2010) — Scientists at the University of Essex have a greater understanding of how our genes are controlled following a major research project.

The findings of the study, which looked at how proteins work as teams to control genes in the cells, could also help to unravel the mechanisms of disease such as cancer.

The five-year research, funded by the Medical Research Council, has been published in *Molecular and Cellular Biology.*

The research team, led by Dr Elena Klenova from the Department of Biological Sciences, looked at the protein called CTCF, which was previously identified as a key 'controller' of many of our genes, making them either active or inactive.

However, the scientists at Essex have discovered that other proteins were working with CTCF for fine tuning of the genes. This collaboration between CTCF and its neighbours at the molecular level provides the mechanism by which CTCF's function as a gene regulator is controlled.

Dr Dawn Farrar, the principal researcher on the project, said the discovery of the link between CTCF and other proteins was a 'fascinating example of molecular teamwork'.

Dr Klenova, said: 'Understanding the factors responsible for the regulation of our genes, and how, why and when particular genes are switched on and off may give us a greater understanding of general biological systems. It also helps us to unravel the mechanisms of disease such as cancer. We believe that our published study has contributed to present knowledge of gene regulation.'

It is hoped scientists will be able to build on this research -- which was undertaken in collaboration with the Cancer Research UK Cambridge Research Institute and Karolinska Institute in Sweden -- to further understand the factors responsible for the regulation of our genes, and how this can lead to disease.

Story Source:

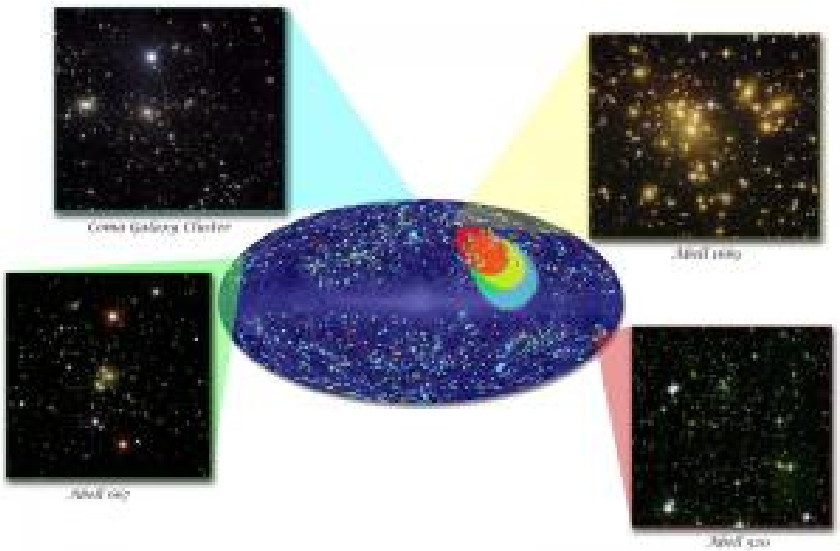
Adapted from materials provided by University of Essex.

Journal Reference:

1. Farrar et al. **Mutational Analysis of the Poly(ADP-Ribosyl)ation Sites of the Transcription Factor CTCF Provides an Insight into the Mechanism of Its Regulation by Poly(ADP-Ribosyl)ation**. *Molecular and Cellular Biology*, 2010; 30 (5): 1199 DOI: 10.1128/MCB.00827-09

http://www.sciencedaily.com/releases/2010/02/100226133540.htm

Mysterious Cosmic 'Dark Flow' Tracked Deeper Into Universe



The colored dots are clusters within one of four distance ranges, with redder colors indicating greater distance. Colored ellipses show the direction of bulk motion for the clusters of the corresponding color. Images of representative galaxy clusters in each distance slice are also shown. (Credit: NASA/Goddard/A. Kashlinsky, et al.)

ScienceDaily (Mar. 11, 2010) — Distant galaxy clusters mysteriously stream at a million miles per hour along a path roughly centered on the southern constellations Centaurus and Hydra. A new study led by Alexander Kashlinsky at NASA's Goddard Space Flight Center in Greenbelt, Md., tracks this collective motion -- dubbed the "dark flow" -- to twice the distance originally reported.

"This is not something we set out to find, but we cannot make it go away," Kashlinsky said. "Now we see that it persists to much greater distances -- as far as 2.5 billion light-years away." The new study appears in the March 20 issue of *The Astrophysical Journal Letters*.

The clusters appear to be moving along a line extending from our solar system toward Centaurus/Hydra, but the direction of this motion is less certain. Evidence indicates that the clusters are headed outward along this path, away from Earth, but the team cannot yet rule out the opposite flow. "We detect motion along this axis, but right now our data cannot state as strongly as we'd like whether the clusters are coming or going," Kashlinsky said.

The dark flow is controversial because the distribution of matter in the observed universe cannot account for it. Its existence suggests that some structure beyond the visible universe -- outside our "horizon" -- is pulling on matter in our vicinity.

Cosmologists regard the microwave background -- a flash of light emitted 380,000 years after the universe formed -- as the ultimate cosmic reference frame. Relative to it, all large-scale motion should show no preferred direction.

The hot X-ray-emitting gas within a galaxy cluster scatters photons from the cosmic microwave background (CMB). Because galaxy clusters don't precisely follow the expansion of space, the wavelengths of scattered photons change in a way that reflects each cluster's individual motion.

This results in a minute shift of the microwave background's temperature in the cluster's direction. The change, which astronomers call the kinematic Sunyaev-Zel'dovich (KSZ) effect, is so small that it has never been observed in a single galaxy cluster.

But in 2000, Kashlinsky, working with Fernando Atrio-Barandela at the University of Salamanca, Spain, demonstrated that it was possible to tease the subtle signal out of the measurement noise by studying large numbers of clusters.

In 2008, armed with a catalog of 700 clusters assembled by Harald Ebeling at the University of Hawaii and Dale Kocevski, now at the University of California, Santa Cruz, the researchers applied the technique to the three-year WMAP data release. That's when the mystery motion first came to light.

The new study builds on the previous one by using the five-year results from WMAP and by doubling the number of galaxy clusters.

"It takes, on average, about an hour of telescope time to measure the distance to each cluster we work with, not to mention the years required to find these systems in the first place," Ebeling said. "This is a project requiring considerable followthrough."

According to Atrio-Barandela, who has focused on understanding the possible errors in the team's analysis, the new study provides much stronger evidence that the dark flow is real. For example, the brightest clusters at X-ray wavelengths hold the greatest amount of hot gas to distort CMB photons. "When processed, these same clusters also display the strongest KSZ signature -- unlikely if the dark flow were merely a statistical fluke," he said.

In addition, the team, which now also includes Alastair Edge at the University of Durham, England, sorted the cluster catalog into four "slices" representing different distance ranges. They then examined the preferred flow direction for the clusters within each slice. While the size and exact position of this direction display some variation, the overall trends among the slices exhibit remarkable agreement.

The researchers are currently working to expand their cluster catalog in order to track the dark flow to about twice the current distance. Improved modeling of hot gas within the galaxy clusters will help refine the speed, axis, and direction of motion.

Future plans call for testing the findings against newer data released from the WMAP project and the European Space Agency's Planck mission, which is also currently mapping the microwave background.

Story Source:

Adapted from materials provided by NASA/Goddard Space Flight Center.

Journal Reference:

1. A. Kashlinsky, F. Atrio-Barandela, H. Ebeling, A. Edge, and D. Kocevski. **A New Measurement of the Bulk Flow of X-Ray Luminous Clusters of Galaxies**. *The Astrophysical Journal*, 2010; 712 (1): L81 DOI: 10.1088/2041-8205/712/1/L81

http://www.sciencedaily.com/releases/2010/03/100310162829.htm

Temporary Hearing Deprivation Can Lead to 'Lazy Ear'

New research reveals why a relatively short-term hearing deprivation during childhood may lead to persistent hearing deficits, long after hearing is restored to normal. (Credit: iStockphoto/Christopher Steer)

ScienceDaily (Mar. 11, 2010) — Scientists have gained new insight into why a relatively short-term hearing deprivation during childhood may lead to persistent hearing deficits, long after hearing is restored to normal. The research, published by Cell Press in the March 11 issue of the journal *Neuron*, reveals that, much like the visual cortex, development of the auditory cortex is quite vulnerable if it does not receive appropriate stimulation at just the right time.

It is well established that degraded sensory experience during critical periods of childhood development can have detrimental effects on the brain and behavior. In the classic example, a condition called amblyopia (also known as lazy eye) can arise when balanced visual signals are not transmitted from each eye to the brain during a critical period for visual cortex development.

"An analogous problem may exist in the realm of hearing, in that children commonly experience a buildup of viscous fluid in the middle ear cavity, called otitis media with effusion, which can degrade the quality of acoustic signals reaching the brain and has been associated with long-lasting loss of auditory perceptual acuity," explains senior study author, Dr. Daniel Polley from the Massachusetts Eye and Ear Infirmary.

Dr. Polley and his colleague Dr. Maria Popescu from Vanderbilt University implemented a method to reversibly block hearing in one ear in infant, juvenile, and adult rats then looked at how auditory brain areas were impacted by the temporary hearing loss.

They observed that the temporary hearing loss in one ear distorted auditory patterning in the brain, weakened the deprived ear's representation and strengthened the open ear's representation. The scope of reorganization was most striking in the cortex (and not "lower" parts of the auditory pathway) and was more pronounced when hearing deprivation began in infancy than in later life. Therefore, it appears that maladaptive plasticity in the developing auditory cortex might underlie "amblyaudio," in a similar fashion to the contributions of visual cortex plasticity to amblyopia.

"The good news about amblyaudio is that it is unlikely to be a permanent problem for most people," concludes Dr. Polley. "Even if the acoustic signal isn't improved within the critical period, the mature auditory cortex still expresses a remarkable degree of plasticity. We know that properly designed visual training can improve visual acuity in adult amblyopia patients. We are gearing up now to study whether auditory perceptual training may also be a promising approach to accelerate recovery in individuals with unresolved auditory processing deficits stemming from childhood hearing loss."

The researchers include Maria V. Popescu and Daniel B. Polley, Vanderbilt University School of Medicine, Nashville, TN.

Story Source:

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

Journal Reference:

1. Maria V. Popescu, Daniel B. Polley. **Monaural Deprivation Disrupts Development of Binaural Selectivity in Auditory Midbrain and Cortex**. *Neuron*, 2010; 65 (5): 718-731 DOI: 10.1016/j.neuron.2010.02.019

http://www.sciencedaily.com/releases/2010/03/100310134148.htm

Obesity Linked to Poor Colon Cancer Prognosis

ScienceDaily (Mar. 11, 2010) — Obese patients with colon cancer are at greater risk for death or recurrent disease compared to those who are within a normal weight range, according to a report in *Clinical Cancer Research,* a journal of the American Association for Cancer Research.

"Obesity has long been established as a risk factor for cancer, but our study in colon cancer patients shows that obesity predicts a poorer prognosis after the cancer is surgically removed," said Frank A. Sinicrope, M.D., professor of medicine and oncology at the Mayo Clinic in Rochester.

There are approximately 150,000 new cases of colon cancer diagnosed each year in the United States, and colon cancer tends to affect men and women equally, said James Abbruzzese, M.D., chairman of the Department of Gastrointestinal Medical Oncology at The University of Texas M. D. Anderson Cancer Center and an editorial board member of Clinical Cancer Research.

"More studies are now demonstrating that obesity plays a role as an independent risk factor for poorer patient prognosis that is unrelated to stroke or heart disease," said Abbruzzese.

Remarkably though, many patients remain unaware of the risk associated between obesity and cancer. Results of a recent survey from the American Institute for Cancer Research showed that only 51 percent of the participants knew about the link between obesity and cancer, compared with 94 percent who were aware of the increased cancer risk associated with tobacco use, and 87 percent who knew of the increased cancer risk associated with sun exposure.

For the current study, Sinicrope and colleagues evaluated 4,381 patients with stage II or stage III colon cancer who had received adjuvant chemotherapy in clinical trials. Of these patients, 20 percent were obese.

Obesity was significantly linked with poorer overall survival and was independent of other variables analyzed. The prognostic impact was stronger in men than in women, and men in the highest body mass index category for obesity had a 35 percent increased risk of death compared to normal weight patients. The weaker effect in women is consistent with studies that have shown a lower risk of developing colon cancer in obese women compared to obese men.

"We do not know if this is due to biology or the way we measure obesity," said Sinicrope. "Body mass index is a limited measure and there is evidence that abdominal fat may be a better predictor of colon cancer risk and perhaps prognosis in men than in women. There is also the potential influence of menopausal status and hormone replacement therapy in women."

Story Source:

Adapted from materials provided by American Association for Cancer Research.

Journal Reference:

1. Frank A. Sinicrope, Nathan R. Foster, Daniel J. Sargent, Michael J. O'connell, and Cathryn Rankin. **Obesity Is an Independent Prognostic Variable in Colon Cancer Survivors**. *Clinical Cancer Research,* 2010; DOI: 10.1158/1078-0432.CCR-09-2636

http://www.sciencedaily.com/releases/2010/03/100309131752.htm

Development of More Muscular Trout Could Boost Commercial Aquaculture

Transgenic trout with "six pack abs." (Credit: Image courtesy of University of Rhode Island)

ScienceDaily (Mar. 11, 2010) — A 10-year effort by a University of Rhode Island scientist to develop transgenic rainbow trout with enhanced muscle growth has yielded fish with what have been described as six-pack abs and muscular shoulders that could provide a boost to the commercial aquaculture industry.

Terry Bradley, a URI professor of fisheries and aquaculture, said his research into the inhibition of myostatin, a protein that slows muscle growth, has obtained "stunning results" in the last two years, with trout growing 15 to 20 percent more muscle mass than standard fish.

"Belgian blue cattle have a natural mutation in myostatin causing a 20 to 25 percent increase in muscle mass, and mice overexpressing myostatin exhibit a two-fold increase in skeletal muscle mass. But fish have a very different mechanism of muscle growth than mammals, so we weren't certain it was going to work," Bradley said.

According to Bradley, the number of muscle fibers in mammals is limited after birth, but in fish, muscle fiber numbers increase throughout their lifespan. Since inhibition of myostatin increases the numbers of muscle fibers, it had been a mystery as to whether inhibiting myostatin would cause an increase in muscle growth in fish.

Bradley and a team of graduate students spent 500 hours injecting 20,000 rainbow trout eggs with various DNA types designed to inhibit myostatin. Of the eggs that hatched, 300 carried the gene that led to increased muscle growth. After two years, most exhibited a "six-pack ab" effect, even though fish lack standard abdominal muscles. They also have increased musculature throughout, including a prominent dorsal hump that made them look like they had muscular shoulders.

The first generation of transgenic trout were subsequently spawned, and offspring carrying the gene in all of their muscle cells have been produced. Studies are under way to determine if the fish grow at a faster rate as well.

"Our findings are quite stunning," said Bradley, who also studies salmon, flounder and tuna. "The results have significant implications for commercial aquaculture and provide completely novel information on the mechanisms of fish growth. The results also allow for comparisons between the mechanisms of growth of muscle in mammals versus fish, and it could shed light on muscle wasting diseases in humans."

About 500,000 metric tons of rainbow trout are raised each year in aquaculture facilities in the United States and Europe. In the U.S., some 1,000 trout farms produce approximately $80 million of trout annually, mostly in Idaho, New York, Pennsylvania and California. Assuming Bradley's transgenic fish

meet with regulatory approval, it could provide a boost to the industry by enabling aquaculturists to grow larger fish without increasing the amount of food the fish are fed.

"One of the advantages of this approach is that the modified genes introduced into the fish use the same mechanism and cause the same type of effect that occurs naturally in Belgian blue cattle and other 'double muscled' animals," said Bradley.

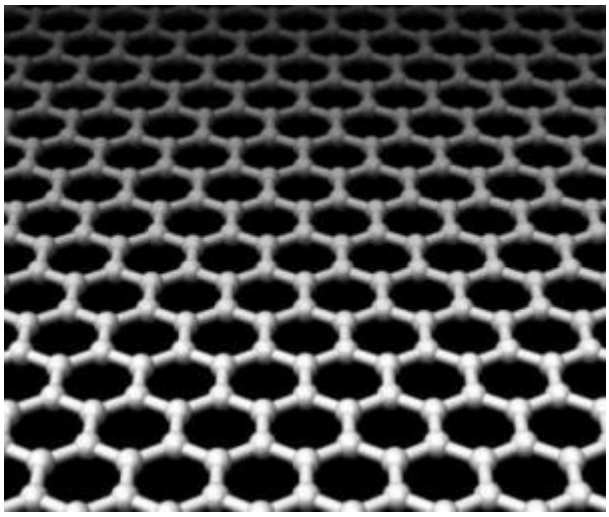
While the transgenic trout may look like bodybuilders, Bradley said they exhibit normal behaviors. He will continue to study the fish to learn if the new gene affects any other genes, and to determine if new husbandry practices will aid in the raising of the trout.

Story Source:

Adapted from materials provided by University of Rhode Island.

http://www.sciencedaily.com/releases/2010/03/100310113540.htm

Huge Step Toward Mass Production of Coveted Form of Carbon



This graphic represents an atom-thin sheet of graphene, a form of carbon that could replace silicon in future electronic devices. Scientists have developed a simple manufacturing method that could allow its mass production. (Credit: Wikimedia Commons)

ScienceDaily (Mar. 11, 2010) — Scientists have leaped over a major hurdle in efforts to begin commercial production of a form of carbon that could rival silicon in its potential for revolutionizing electronics devices ranging from supercomputers to cell phones. Called graphene, the material consists of a layer of graphite 50,000 times thinner than a human hair with unique electronic properties. Their study appears in ACS' *Nano Letters*.

Victor Aristov and colleagues indicate that graphene has the potential to replace silicon in high-speed computer processors and other devices. Standing in the way, however, are today's cumbersome, expensive production methods, which result in poor-quality graphene and are not practical for industrial scale applications.

Aristov and colleagues report that they have developed "a very simple procedure for making graphene on the cheap." They describe growing high-quality graphene on the surface of commercially available silicon carbide wafers to produce material with excellent electronic properties. It "represents a huge step toward technological application of this material as the synthesis is compatible with industrial mass production," their report notes.

Story Source:

Adapted from materials provided by American Chemical Society, via EurekAlert!, a service of AAAS.

Journal Reference:

1. Aristov et al. **Graphene Synthesis on Cubic SiC/Si Wafers. Perspectives for Mass Production of Graphene-Based Electronic Devices**. *Nano Letters*, 2010; 10 (3): 992 DOI: 10.1021/nl904115h

http://www.sciencedaily.com/releases/2010/03/100310134300.htm

Mystery of Symmetry in Vertebrates Revealed

ScienceDaily (Mar. 11, 2010) — Some of our organs, such as the liver and the heart, are lateralised. As our bodies develop they mostly display bilateral symmetry across the vertebral column. A new molecular pathway, which plays a role in this symmetry in vertebrates, has recently been discovered by a Franco-American team led by Olivier Pourquié at the Stowers Institute for Medical research, who moved a short while ago to the Institute of Genetics and Molecular and Cellular Biology (CNRS / Inserm / University of Strasbourg).

This work was published February 18, in *Nature.*

Vertebral symmetry appears early in the course of embryonic development, at the time when somites are formed. Somites are cubic shaped structures from which the vertebrae and the muscles, in particular, are derived. Under the influence of an internal clock, pairs of somites develop, in a periodic manner, starting from the internal cellular layers of the embryo. Retinoic acid, a derivative of vitamin A, appears to play a significant role in controlling the symmetry of the somites. Moreover, it is known that semitogenesis becomes desynchronised in mice which are deficient in retinoic acid.

In a study performed on mouse embryos, the researchers investigated the Rere protein, also known as atrophin 2. They showed that this molecule participates in the activation of the signalling pathway for retinoic acid by forming a complex with two other proteins, Nr2f2 and p300, and a retinoic acid receptor. Mice mutated for the Rere gene show the same retarded somite formation as mice which are deficient in retinoic acid.

Their work also showed that the proteins, Nr2f2 and Rere, control the asymmetry of the signalling pathway for retinoic acid. This asymmetry is required to correct interference with the signals which determine the lateralisation of organs. Hence, this study improves our understanding of how the general symmetry of the body can be reconciled with the lateralisation of some organs.

In man, the anomalies in symmetric development of the somites could be responsible for vertebral symmetry disorders such as scoliosis. A defect in the regulation of functions performed by RERE or Nr2f2 on the retinoic acid signalling pathway may be implicated in the occurrence of these frequent, and sometimes acute, diseases.

References:

"Rere controls retinoic acid signalling and somite bilateral symmetry"

Story Source:

Adapted from materials provided by CNRS.

http://www.sciencedaily.com/releases/2010/02/100226204549.htm

Sequencing Genome of Entire Family Reveals Parents Give Kids Fewer Gene Mutations Than Was Thought

Scientists have sequenced the entire genome of a family of four -- the parents, daughter, and son. (Credit: iStockphoto)

ScienceDaily (Mar. 11, 2010) — Researchers at the University of Utah and other institutions have sequenced for the first time the entire genome of a family, enabling them to accurately estimate the average rate at which parents pass genetic mutations to their offspring and also identify precise locations where parental chromosomes exchange information that creates new combinations of genetic traits in their children.

Led by scientists at the Seattle-based Institute for Systems Biology, the study, published March 11, 2010 in *Science* Express, sequenced the entire genome of a family of four -- the parents, daughter, and son. By comparing the parents' DNA sequences to those of their children, the researchers estimated with a high degree of certainty that each parent passes 30 mutations -- for a total of 60 -- to their offspring.

Scientists long had estimated that each parent passes 75 gene mutations to their children.

"That's the kind of power you get from looking at the whole genome," said Lynn B. Jorde, Ph.D., professor and chair of the Department of Human Genetics at the University of Utah School of Medicine. "The mutation rate was less than half of what we'd thought."

Genetic Clock

Most mutations, as far as medical researchers know, have no consequence for a child's health. But knowing the rate at which parents send on mutations to their offspring is critical information, according to Jorde. "The mutation rate is our clock, and every time it ticks we have a new genetic variant," he said. "We need to know how fast the clock ticks."

Everybody has about 22,000 genes, which contain the genetic blueprint for human life. This blueprint, called DNA, comprises more than 3 billion "base pairs" that determine genetic makeup. In1990, scientists worldwide began assembling the entire sequence of base pairs in all 22,000 human genes, a process called sequencing. When they completed the project in 2003, the scientists had put together the complete picture of the proper sequence of base pairs in the human genome.

When Jorde and the Science study's senior author, David J. Galas, Ph.D., of the Institute of Systems Biology, were discussing the idea of sequencing the genome of an entire family, they decided to look for one with known genetic disorders. A family of four turned out to be right for the study. Although the parents had no genetic abnormalities, they each carried recessive genes that resulted in their son and daughter being born with two extremely rare conditions -- Miller's syndrome and Primary Ciliary Dyskinesia (PCD).

Miller's syndrome, a disorder characterized by facial and limb malformations, is thought to occur in perhaps one in 1 million people and has been diagnosed in only two families in the world, along with a few sporadic other cases.

PCD is a condition in which the tiny hair-like structures that are supposed to move mucus out of airways in the lungs do not function. The chances of having PCD are estimated at one in 10,000. The odds of someone having both PCD and Miller's syndrome are less than one in 10 billion, according to Jorde.

By comparing the variants in the children's DNA sequences with the Human Genome Project and other public databases, the researchers confirmed an earlier study that identified four candidate gene mutations for causing each disorder.

Gene Mutation Rate

Genetic mutations are passed to offspring when base pairs of DNA are altered in the genome. A Mountain View, Calif., company, Complete Genomics, used new, high-powered technology to sequence the genomes of each family member. Then, using the DNA sequence established by the Human Genome Project as a reference, Chad D. Huff, Ph.D., a post-doctoral fellow in Jorde's lab and co-first author on the study, compared the family's DNA base pair sequences to those established by the Human Genome Project.

"Comparing the family's sequences to the Human Genome Project allowed us to screen out potential errors in the DNA sequencing process," Jorde said. "To estimate the mutation rate, we compared the parents' sequences with those of their children. Differences in the sequences that were not caused by sequencing errors were caused by mutations."

From this, Huff estimated the number of gene mutations each parent gives their child. This rate probably will vary, according to Jorde, depending on how old the parents are, particularly the father, when they reproduce.

To find the locations where parental chromosomes exchange genetic information, which are called crossover sites, the researchers compared variations in the parents' DNA sequences to their children's, looking for blocks of DNA that the son and daughter inherited intact from the parents. When they found blocks that were interrupted, the researchers concluded they'd identified the crossover sites.

"We found that 60 percent of the crossovers take place in specific hotspots on the chromosomes," Jorde said. "We were able to locate these sites right down to the base pairs."

Future Studies

The study opens the door for numerous other investigations in the future. Jorde expects researchers will use family sequence analysis to begin narrowing down the genetic causes of more common diseases. And, as the cost of genome sequencing continues to drop -- the Human Genome Project cost about $3 billion, and now individuals can get their genome sequenced for $5,000 to $10,000 -- it will be an important part of individual medical records, the researchers believe.

"We would predict that the information derived from family genomes, along with relevant environmental and medical information, will constitute the medical records of the future," the study concludes.

Along with the Institute for Systems Biology and the University of Utah, researchers in genetics and pediatrics from the University of Washington contributed to the study. Jared C. Roach, M.D., Ph.D., Gustavo Glusman, Ph.D., and Arian F.A. Smit, Ph.D., all of the Institute for Systems Biology, were the study's co-first authors along with the University of Utah's Chad D. Huff, Ph.D.

Story Source:

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

Journal Reference:

1. Jared C. Roach, Gustavo Glusman, Arian F. A. Smit, Chad D. Huff, Robert Hubley, Paul T. Shannon, Lee Rowen, Krishna P. Pant, Nathan Goodman, Michael Bamshad, Jay Shendure, Radoje Drmanac, Lynn B. Jorde, Leroy Hood, and David J. Galas. **Analysis of Genetic Inheritance in a Family Quartet by Whole-Genome Sequencing**. *Science*, 2010; DOI: 10.1126/science.1186802

http://www.sciencedaily.com/releases/2010/03/100310175141.htm

Gastric Bypass Surgery Increases Risk of Kidney Stones, Study Suggests

ScienceDaily (Mar. 11, 2010) — Patients who undergo gastric bypass surgery experience changes in their urine composition that increase their risk of developing kidney stones, research from UT Southwestern Medical Center investigators suggests.

A new study, published in the March issue of *The Journal of Urology,* found that some of these urinary changes place weight-loss surgery patients at higher risk for developing kidney stones than obese patients who do not undergo the procedure.

For the study, researchers collected urine samples from 38 study participants. There were 16 women and three men in each of two groups. One group had undergone Roux-en-Y gastric bypass (RYGB) surgery; the second group contained normal obese individuals. RYGB, which is one of the most commonly performed weight-loss procedures, involves the creation of a small gastric pouch and allows food to bypass part of the small intestine.

The researchers found that the excretion of a material called oxalate in urine was significantly greater in the participants who had the surgical procedure than those who did not (47 percent, compared with 10.5 percent, respectively). In addition, the amount of a chemical called citrate in the urine was low in many gastric bypass patients in comparison to the obese nonsurgical group (32 percent to 5 percent).

Oxalate is found in the majority of kidney stones, while citrate inhibits stone formation.

"Almost half of the patients who had undergone gastric bypass and did not have a history of kidney stones showed high urine oxalate and low urine citrate -- factors that lead to kidney-stone formation," said Dr. Naim Maalouf, assistant professor of internal medicine in the Charles and Jane Pak Center for Mineral Metabolism and Clinical Research and the study's lead author.

The cause for stone formation after bariatric surgery is not entirely clear, but the study reinforces the message that weight-loss surgery patients and their physicians should be alert to the heightened risk, Dr. Maalouf said.

"These findings illustrate that the majority of patients are at risk for kidney-stone formation after RYGB," Dr. Maalouf said. "This complication may not be well-recognized in part because it tends to occur months to years after the bypass surgery."Other UT Southwestern researchers involved in the study were Dr. Eve Guth, assistant professor of internal medicine; Dr. Edward Livingston, chief of GI/endocrine surgery; and Dr. Khashayar Sakhaee, chief of mineral metabolism and the study's senior author.

The research was supported by the National Institutes of Health.

Story Source:

Adapted from materials provided by UT Southwestern Medical Center, via EurekAlert!, a service of AAAS.

Journal Reference:

1. Naim M. Maalouf, Prasanthi Tondapu, Eve S. Guth, Edward H. Livingston, Khashayar Sakhaee. **Hypocitraturia and Hyperoxaluria After Roux-en-Y Gastric Bypass Surgery**. *Journal of Urology*, 2010; 183 (3): 1026-1030) DOI: 10.1016/j.juro.2009.11.022

http://www.sciencedaily.com/releases/2010/03/100310175143.htm

Behavioral Problems in Childhood Doubles the Risk of Chronic Widespread Pain in Adult Life

ScienceDaily (Mar. 11, 2010) — Bad behaviour in childhood is associated with long-term, chronic widespread pain in adult life, according to the findings of a study following nearly 20,000 people from birth in 1958 to the present day.

Chronic widespread pain is a common complaint that can have a major adverse effect on quality of life, often requiring referral to a hospital specialist for investigation and treatment. The research, published online in the journal *Rheumatology* on March 10, found that children with severe behaviour disturbances had approximately double the risk of chronic widespread pain by the time they reached the age of 45 than children who did not have behaviour problems.

The researchers found that this association was not explained by social class, early reporting of symptoms or an already-known link between adult psychological distress and chronic widespread pain (CWP). Instead, they believe that a dysfunction in the interaction between the nervous system and hormones, occurring in early life, may have long-term consequences for adult health.

The lead author of the study, Dr Dong Pang, an epidemiologist at the University of Aberdeen (UK), said: "We know already that severe adverse events in childhood such as hospitalisation after a road traffic accident and separation from mothers are linked to CWP in adulthood. In addition, aspects of childhood behaviour are strongly related to children reporting CWP. However, until now, it was unknown whether maladjusted behaviour in children was a long-term marker for CWP in adulthood. Our study shows that it is.

"We are not sure what underlying biological mechanism underpins this relationship, but one possible explanation might be that both the childhood behaviour and the adult CWP are due to a long-term neuroendocrine dysfunction beginning in early life. The hypothalamic-pituitary-adrenal (HPA) axis, the primary neuroendocrine stress response system, has been shown to be associated with childhood behaviour. Similarly, altered HPA axis function has been reported to be associated with CWP. Early life experience, such as emotional stress due to past trauma, may have a lifelong impact on the neuroendocrine system (HPA axis), which in turn leads to behavioural problems in childhood and CWP in adulthood as well as other mental problems. Further research at molecular and genetic level are needed to clarify this."

The researchers followed a group of 18,558 children who were born in one week in 1958 in England, Scotland and Wales, and an additional 920 children who were born in the same week overseas and who came to the UK before the age of 16. Information was collected at regular intervals, including at the ages of 7, 11 and 16, and at 42 and 45 in adulthood. Parents and teachers independently assessed the children's behaviour on aspects such as restlessness, worrying, solitariness, ability to make friends, obedience, stealing, sucking thumbs and biting nails, lying, bullying, truanting etc. At the age of 42 the participants completed a questionnaire asking about psychological distress in adult life, and at the age 45 they completed another one about pain.

The study found that CWP was slightly more common in women than in men (12.9% versus 11.7%). Children whose teachers had reported severe persistent behaviour problems at all ages (7, 11 and 16) had more than double the risk of CWP in adulthood compared with children without behaviour problems at all ages. If the children had severe behaviour problems at 11 and 16, then they had nearly double the risk of CWP in later life. Similar, but weaker associations were shown for parent-reported behaviour, which the researchers believe is because teachers tend to be better at providing objective assessments of behaviour as they have more children to compare.

The researchers say that it is not just CWP that is associated with bad behaviour in childhood. Other adult problems that are associated with childhood behavioural problems include long-term psychiatric problems such as depression and anxiety, suicidal behaviour, substance abuse and treatment for psychiatric illness.

They suggest that all these problems may be outcomes of the chain of events set in motion by the dysfunctioning neuroendocrine system. If further research proves this to be the case, then it might be possible to intervene in early life to prevent these problems occurring later.

Professor Gary Macfarlane, the leader of the research group, said: "This study helps us to understand the factors in childhood that can lead someone to get on a trajectory of ill-health, including chronic pain. The disruption to the hypothalamic-pituitary-adrenal (stress-response) axis is one biological marker of the effect of such experiences and this could help to identify persons at higher risk of chronic pain. Interventions would be lifestyle focussed and would include identification and treatment of behavioural and emotional factors, but would also address lifestyle factors such as increased physical activity.

"We plan to undertake some studies in children to understand what range of factors cause a disturbance to the stress-response axis; such work can then inform what intervention studies may be appropriate."

Story Source:

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

Journal Reference:

1. Dong Pang, Gareth T. Jones, Chris Power and Gary J. Macfarlane. **Influence of childhood behaviour on the reporting of chronic widespread pain in adulthood: results from the 1958 British Birth Cohort Study**. *Rheumatology*, (in press) DOI: 10.1093/rheumatology/keq052

http://www.sciencedaily.com/releases/2010/03/100309202920.htm

His Next Act: Driving Out Apartheid's Ghost
By CELIA W. DUGGER

CAPE TOWN — Athol Fugard, the renowned South African playwright, paced at the edge of a plywood stage, rubbing his head and listening intensely to two actors run through their lines. Rehearsals for his new play, "The Train Driver," had begun.

With stents in his arteries and his hearing fading, Mr. Fugard, 77, is back telling stories shaped by South Africa's tormented racial history. But for the first time, a drama by this grand old man of the South African stage will have its premiere at the Fugard, a new theater named in his honor.
"I want you to do something for me," Mr. Fugard told Sean Taylor, who plays a white train driver searching for the grave of a black woman who had stood on the tracks directly in his path with a baby on her back, waiting for death. Mr. Taylor had laughed dementedly in Scene 3. Mr. Fugard, directing a play for the first time in a decade, told him, "Nothing is funny. No jokes. It's all real."
The Fugard is among many privately organized efforts — in culture, education and social services — that aim to help South Africa overcome the damage wrought by its colonial and apartheid-era past. The theater's creators hope the transfiguring power of art will help change this breathtakingly beautiful, but still highly segregated, city by the sea.
Housed in what were once 19th-century textile warehouses and an old Gothic church hall, the Fugard now provides a permanent home for Isango Portobello, an all-black troupe of actors and singers, mostly from the nearby township of Khayelitsha, that has won critical acclaim across Europe.
The hope is that the Fugard and its resident acting ensemble will attract people of all races to mingle on its upholstered benches. Eric Abraham, the South African-born film and theater producer who has financed both the theater and Isango Portobello, said he believes the talents of the acting ensemble will prove to be "an antidote to prejudice." The seating has been intentionally left open so serendipity can bring people together.
"It's about aspirational hope, and that's as much needed as delivery of water, electricity and shelter in this city," Mr. Abraham said.
The theater had its gala opening last month on the fringes of District Six, an area with particular resonance here. In 1966, the district was designated for whites only and its mostly mixed-race (as they were classified) residents were forced out and their homes bulldozed as part of the white minority government's apartheid scheme.
At the opening, the country's deputy president and various cabinet ministers watched Isango Portobello perform "The Magic Flute - Impempe Yomlingo," with Mozart's score transposed for an orchestra of marimbas.
"I assure you that every audience in this house will be sitting in the lap of a ghost," Mr. Fugard, his eyes brimming with tears, told the audience, referring to the 60,000 residents of District Six who were driven from their homes during the apartheid years.

In 2008 the production, which played at the Young Vic and the Duke of York's in London, won an Olivier Award for best musical revival. This year it won the Globes de Cristal Award for opera after a season at the Théâtre du Châtelet in Paris.

A memorable cast of characters has brought the theater and acting company to life. Mr. Abraham, 56, who put up some $7 million for the two undertakings, grew up in privileged white Cape Town. He was placed under house arrest in 1976 for reporting on black politics for the BBC. The following year he went into exile in England, where he was granted political asylum and made his career. He lives in London and is married to the Swedish philanthropist and publisher Sigrid Rausing.

Mark Dornford-May, 54, is the burly, British artistic director of the acting company. He first put together a black cast to perform at a wine estate's 2000 summer festival near Cape Town by spreading the word through township choirs. Two thousand singers showed up to audition. One of them was Pauline Malefane, 33, a sublime soprano who is now his wife and a musical director of the company. More than eight months pregnant, she performed as the Queen of the Night in "The Magic Flute" until recently.

Mannie Manim, 68, executive director of the Fugard and a veteran theater manager, was an usher at the Brooke Theater in Johannesburg in 1958 who literally raised the curtain on Mr. Fugard's play "No-Good Friday." He said that he has produced every play Mr. Fugard has written since the late 1960s and that he hopes the Fugard will be "a crucible for excellence."

"This will be the South African response to the Royal Shakespeare Company, if you like," Mr. Manim said. "He's our Shakespeare."

The theater's organizers acknowledge that they have a long way to go in building a multiracial audience. On a recent Wednesday evening, virtually every person at "The Magic Flute" was white, a fact regretfully noted by the theatergoers themselves.

"It looks like the Cape Town liberal elite," said Jacky Davis, a British doctor who volunteered in a black township 30 years ago and was visiting the city as a tourist.

Mr. Fugard said in an interview that the new democratic South Africa — struggling with poverty and corruption, among other challenges — needs the arts of stagecraft "as urgently as the old South Africa needed those first few daring, sometimes suicidal acts of defiance in the theater."

"The Train Driver," which opens on March 24, gestated in Mr. Fugard's mind for years after he read an article in the Mail & Guardian, a South African weekly, about a black woman named Pumla Lolwana from a Cape Town squatter camp. On Dec. 8, 2000, she stood on the tracks with her three children, Lindani, Andile and Sesanda, and waited for a train to kill them all.

"I cannot fathom a darkness so deep that a human being can finally say, 'There is no hope,' " Mr. Fugard said.

He wound up telling an imagined version of the story through the white train driver's outpouring of rage and grief, witnessed by a black grave digger in the cemetery where the woman and her child — stand-ins for Ms. Lolwana and her children — had been buried in an unmarked grave. Everything he has written before, Mr. Fugard said, was "a journey to the writing of this play."

In the play, the train driver claims the dead mother and baby, as Mr. Fugard said his own plays have sought to "claim people, refusing to allow them to pass on into oblivion, trying to bear witness."

Mr. Fugard, who now lives in San Diego, said that an American friend, Stephen Sachs, the co-artistic director of the Fountain Theater in Los Angeles, wrote to him, saying the play was a summation of "who you are, your life-long internal struggle, the long road you've traveled as an artist and a white man in South Africa."

"White guilt," Mr. Sachs wrote. "White shame. Digging up the bones of the nameless black dead. Trying to make sense of it. Give it meaning."

http://www.nytimes.com/2010/03/13/theater/13fugard.html?ref=arts

At the Guggenheim, the Art Walked Beside You, Asking Questions
By ALICIA DESANTIS

A few Saturdays ago, a teenage visitor to the Guggenheim Museum, a girl in a black beret, slid open the door to the Aye Simon Reading Room and peered in at a group of people in animated conversation. “Is there something going on in here?” she said.

A woman wearing red lipstick and Converse sneakers glared at her for a moment and turned away. “It’s a staff room,” a tall man in a plaid shirt said brusquely.
The girl in the beret backed up and slid the door closed. If she had been looking for art — there was none to be seen on the walls of the rotunda at the time — she had found it. But it was rather emphatically taking a break.
The men and women in the room were part of “This Progress,” a work by the British-German artist Tino Sehgal that took over the rotunda for the last six weeks. In the piece, which closed Wednesday, visitors were ushered up the spiral ramp by a series of guides — first a child, then a teenager, then an adult and finally an older person — who asked them questions related to the idea of progress.
Over the course of several hours-long shifts a week for the six-week run of the show, each of these guides, or “interpreters” as Mr. Sehgal calls them, spent a few minutes walking and talking with one or more visitors at a time, then moved on to the next. The show was extremely popular, with final ticket sales of more than 100,000, and on busy weekends a guide might interact with as many as 70 people in a day. By the time the guides retired to one of the break rooms — the reading room had been set aside for the teenagers and adults — they were taking refuge from encounters with the public.
Still, they were clearly invested in the spirit of the project. Mr. Sehgal, 34, is known for keeping a tight rein on every aspect of his work; he refused to divulge information about “This Progress” in advance, for example, and prohibited the taking of pictures. And his interpreters, although willing to allow a reporter into their midst while the show was on, were likewise reluctant to say much about it until it was over.
“It’s an elaborate social contract,” explained Ashton Applewhite, 57, a writer from Brooklyn who was one of the guides. “It would ruin something of the piece” for visitors to be exposed to its inner workings before they had experienced it themselves. As one of the teenagers put it, “What happened on the ramps stayed on the ramps.”
Speaking on Thursday, several of the more than 300 people who had been recruited for the show through e-mail messages and later in interviews (and in the case of the children, an elaborate series of auditions) confirmed that their starring roles in the season’s most talked-about artwork had been challenging, even trying at times. But most also seemed to have found the job and the wide-ranging and often philosophical dialogues it involved inspiring.
“This kind of conversation usually only happens when two people are drunk or something, or on the subway,” said Rafay Rashid, 20, a freshman at the State University of New York, Purchase. “There are

great things in this world and one of them is talking to people, especially strangers. Rarely do you make eye contact with someone and try to figure out where they're coming from."
George Blecher, a 69-year-old writer and sometime actor, said he had not become one of those "who are ready to follow Tino around the earth" as a result of the experience, but he seemed to have gotten what he wanted from it.
"As you get older, your social life diminishes," he said. "To a great extent older people really suffer from loneliness."
At the same time, he added: "I ran out of steam after six weeks. You have to be alert and you're giving so much."
He was not alone. "After it was all over I had this image of all of us with these big metal windup keys in our backs," Ms. Applewhite said. "How long would it take for us to all wind down?"
The schedule could be grueling even for much younger interpreters, who, unlike their elders, were unpaid. (They did receive a hat, bag and a museum membership; adults were paid $18.75 an hour, teenagers $7.25 an hour.) Solomon Bender, an 11-year-old sixth grader at the School at Columbia University who was one of the oldest children in the piece, said many of the younger ones had trouble with the pace of 40 to 50 interactions a day, 60 to 70 on weekends.
"They had a workload breakdown," he said. "They would have liked more snacks."
Some of the problem may have had to do with the intellectual rigors of the job. The younger children were "all pretty smart for their age," he said, but "I've never met a 7-year-old who can match an 11-year-old in a conversation about philosophy."
But even older interpreters found the pressure of nonstop thoughtful conversation draining. Bran Wasti, 16 and a junior at Hunter College High School, recalled that on his first day as a guide, one of the visitors had defined progress as "deprivatizing the Federal Reserve." "I had absolutely no idea how to talk about it," he said. ("I looked it up later, and it's absolutely not true.")
And Vinnie Wilhelm, a 31-year-old writer from Philadelphia, initially felt he needed to summon "the intellectual dexterity of Kant or Diogenes" to do the job, "as if you had to have these nuggets of intellectual insight so you could awe them with your oracular intelligence."
Asad Raza, the producer of the exhibition and the recruiter of most of the guides, said he had seen the work improve over time, as the guides became more relaxed and more willing to be themselves. "There was a kind of anxiety about being chosen for their intelligence," he said. It could lead to grandstanding. By the end, he said, the piece had become more personal.
Museum visitors, meanwhile, some of whom had no idea what to expect of the show, were not always relaxed about being approached by chatty strangers.
"I felt bad about it," Mr. Rashid said. "You'd get rejected halfway up the ramp. They say something like 'I think we're here for the art.' "
The trick was not to take it personally. "If you get rejected it's because they weren't interested, not because you weren't interesting," he said, as if repeating a mantra.
And as in any service job, the customers could be difficult. At one point Betsy Carroll, 20, a junior at Columbia University, found herself refereeing a lovers' quarrel. She had asked a couple "Do you learn from your mistakes?" The man said yes. His companion, a woman, rather vehemently disagreed.
"She had a lot of anger about that," Ms. Carroll recalled. "She chose this moment to bring it up."
Daniel Kaiser, 73, a literature professor at Sarah Lawrence, noted that "European and Asiatic couples are very polite — they listen to what you say." American college students, on the other hand, "are the worst — they have bad manners."
In the reading room where the adults gathered, a joke circulated in which a guide pushes a particularly annoying visitor over the edge of the ramp rail. Gesturing toward the body below, the guide would announce the title of the new work: "Tino Sehgal, 'This Pancake,' 2010."
But even those who found the gig trying seemed generally happy with their experience, and hopeful about sustaining some of the connections they had made. "One of the things I'm anticipating is that someone will come up to me in a coffee shop and say 'Hey, I talked to you at the Guggenheim,' " Mr. Blecher said.
In the final days of the show, feeling ill, he took a taxi home after his last shift. He began talking to the cab driver, a New Yorker of 31 years. " 'I love to have these interesting conversations,' " said the driver.
"I've been practicing a lot," Mr. Blecher replied.

http://www.nytimes.com/2010/03/13/arts/design/13progress.html?ref=arts

'MARINA ABRAMOVIC: THE ARTIST IS PRESENT'
Performance Art Preserved, in the Flesh
By HOLLAND COTTER

With the opening on Sunday of "Marina Abramovic: The Artist Is Present," a long-building energy wave of performance art hits the Museum of Modern Art full force. The show is a four-decade survey of work by one of the field's most visible and magnetic figures. And its combination of stressed-out flesh in documentary films and live bodies, some nude, in the galleries, makes pretty radical fare for this institution.

If the exhibition is uneven — part true grit, part diva hokum — it is rarely uninteresting. And it comes with a mission: to demonstrate that it is possible to preserve performance art, an ephemeral medium, through live re-creations in a museum setting. Ms. Abramovic is confident that this can be done, and to prove it has inserted restaged pieces from her own past into an otherwise standard documentary show. Whether her faith is justified is the question. Based on the evidence here, I'd say no.
Ms. Abramovic was born in Belgrade, Yugoslavia, in 1946. Her parents were heroes of the Yugoslav revolution under Tito and lived well as a result. She inherited their instinct for personal valor, but under the emotional rigors of family life also developed a rebellious streak.
Although she initially studied painting in an art school, in the late 1960s she began experimenting with performance and soon came up with work as startling for its physical heedlessness as for its intensity of concentration. For a 1973 piece called "Rhythm 10," she turned on a tape recorder, splayed out her hand on the gallery floor, then quickly and repeatedly stabbed at the spaces between her fingers with one of ten knives, changing knives each time she cut herself. After she'd gone through all the knives, she replayed the tape and repeated the performance, blow by blow as recorded, on the bloody floor.
For "Rhythm 0" a year later she placed 72 objects — including a candle, a rose, a scalpel, some pins and a gun — on a table and invited audience members to apply them to her body in whatever way they wanted as she stood, unresisting, for six hours. Most of the responses were benign, but some were not. Fights broke out between people who wanted either to assault or to protect her. She may have had fears about the direction the ordeal might take, but the important thing for her was that the audience was part of the performance. She fed off its energy, a dynamic she still depends on and solicits.
Naturally, her art existed in an international context; as early as the mid-1960s Yoko Ono had let people snip away bits of her clothing, though Ms. Abramovic didn't know about that. By the 1970s feminism

was certainly part of the larger picture. She has repeatedly disavowed any interest in it, and by its lights her art remains problematic. Are her early performances extreme expressions of female agency, or of abject passivity?

These questions grew more complicated beginning in 1976, when she met the German artist Frank Uwe Laysiepen, who called himself Ulay. They became lovers and collaborators for a dozen years, most of those spent on the road. Their initial performances, recorded on video, were in the aggressive mode of her solo work: they banged their bodies together for hours on end, screaming at each other until their voices gave out.

For a thriller of a piece called “Rest Energy” they faced each other and together held a large bow and arrow. Ms. Abramovic grasped the bow while Mr. Laysiepen pulled the string taut, aiming the arrow at her heart.

At the same time the artists were evolving performances based on stillness, silence and endurance. For the 1977 “Imponderabilia” they stood naked and unmoving inside the frame of a museum doorway, forcing people going from gallery to gallery to squeeze between them. In the same year they sat back to back, their long hair braided together, for 17 straight hours. Both pieces, and several others, have been recreated for the MoMA show, using performers trained by Ms. Abramovic.

Through the late 1970s the couple moved back and forth across Europe in a van, living to perform and performing, for the most part, according to a code that dictated “no rehearsal, no predicted end, no repetition.” As it happened, their single most demanding work, the meditative “Nightsea Crossing,” involved both preparation and repetition. Conceived to be performed 90 times, it consisted of them sitting at either end of a plain wooden table staring into each other’s eyes for hours, until physical discomfort or exhaustion forced them to stop.

In the 1980s their travels became more exotic. They spent nearly a year living with Aborigines in the Australian desert and visited Tibetan Buddhist monasteries in India. The stage for their final performance, in 1988, was the Great Wall of China. Starting from opposite ends of the wall, they walked toward each other for three months. Originally the meeting was to have been the occasion for their marriage; in the event it marked their break-up.

In any case, by this point their collaborations were suffering, growing ever more calculated and heavy with cultural-tourist baggage: snakes, crystals, flutes and so on. Performances had started to smack of religious ritual and Orientalist theater, elements of which remain active in Ms. Abramovic’s performances since she resumed her solo career.

For one she perched nude on a bicycle seat high on a gallery wall, bathed in light, in a pose vaguely reminiscent of a crucifixion. In another she lay under a skeleton to make it appear to breathe. In the much-noticed “House With An Ocean View” (2002) she lived in Sean Kelly Gallery in Chelsea for 12 days, confined to three containerlike rooms — together they suggested a triptych altarpiece — elevated above the floor, with the front wall open, allowing visitors to watch her ritualistically nap, shower, dress, drink water and urinate, then do the same all over again.

The piece drew rapt devotees, was taped from start to finish and was painstakingly transcribed into print by the writer James Westcott, who was for a while her assistant (and recently produced, with her cooperation, a clear-eyed, nonhagiographic biography called “When Marina Abramovic Dies”).

Ms. Abramovic’s most dramatic work of the past several years was her wrenchingly operatic contribution to the 1997 Venice Biennale, called “Balkan Baroque,” for which she spent four days sitting in a sweltering basement on a pile of bloody cow bones, cleaning the bones while singing childhood folksongs and weeping.

The piece, widely considered to be her response to the war then in progress in her former homeland, is reconstructed at MoMA with some of its original props, but makes a strange effect: it feels light, even farcical, like the fake ethnological films of Balkan folk-culture she cooked up a decade later. Of course no accurate approximation of the Venice piece, with its blood and its stink, could find its way into a museum, though it’s hard to imagine a greater distance between an ephemeral work and an institutional re-creation.

It may be that the crucial missing ingredient in this piece is the live presence of Ms. Abramovic. It counts for a lot. When she recreated a series of early solo performances by artists she admired — Vito Acconci, Joseph Beuys, Bruce Nauman, Gina Pane, and Valie Export — at the Guggenheim Museum in 2005, her personal magnetism carried the day. If the performances were impersonations rather than accurate revivals, dramatized rather than conserved history, they still made an impact.

Theoretically it should be easier to preserve performances that never depended on such personal magnetism to begin with. Allan Kaprow's "Eighteen Happenings in Six Parts," dated 1959, would seem like a natural for revival. The original was a series of simple, closely choreographed actions executed by amateur performers, and Kaprow wasn't among them. Yet a reconstruction of the work presented at Performa 07, though exhaustively researched and rehearsed, was a dud.

Maybe it couldn't have been otherwise. The work and the sense of energizing newness it once radiated were, as Kaprow knew, the product of a particular time and culture. The recreated performances in MoMA's show are similarly products of a milieu that once made them transgressive, poetic or simply gave them heat, but is now gone. And, through no fault of the performers, the pieces feel like leftover things: flat, dutiful; artifacts.

It is possible that Ms. Abramovic can make a case for resurrecting art that yearns to vanish. And she is going to try: she recently established the Marina Abramovic Institute for Preservation of Performance Art in an old church in Hudson, N.Y., near where she has a home. It is scheduled to open in 2012.

And there is the MoMA show — organized by Klaus Biesenbach, director of the P.S. 1 Contemporary Art Center and chief curator at large for MoMA — to which she has contributed a new performance piece, called "The Artist Is Present," made from an old one. Essentially, it's a solo version of "Nightsea Crossing," with Ms. Abramovic sitting silent at a table in the museum's atrium, facing an empty chair. She's scheduled to sit there all day, every day, during museum hours, for the run of her show. The museum estimates that, if she can stick to the plan, she will sit for 716 hours and 30 minutes, earning her a record for endurance in the performance art sweepstakes.

In a sense the whole business is another act of self-enshrinement in the art world's ego Olympics, and that's not interesting. Divas are a dime a dozen, and I don't trust charisma anyway. More interesting, because it ties in with her impulse to conserve a possibly unconservable art form, is the way "The Artist Is Present" attempts to control time, hers and ours.

I have no idea what her experience of sitting in that atrium for all those hours will be; there has to be some serious agony involved, which is where she hooks up with her implacably daredevil younger self. But my guess is that her presence will have a demonstrable effect on visitors to the museum; that it will slow them down, get them out of drive-by looking mode.

And every now and then someone will slip into that chair across from her — that's what it's there for — and spend some time exchanging stares, or energy, or going blank, or thinking, maybe for the first time, about that hard, high-flown, funny word "endure."

"Marina Abramovic: The Artist Is Present" opens Sunday at the Museum of Modern Art (212-708-9400; moma.org) and remains on view through May 31.

http://www.nytimes.com/2010/03/12/arts/design/12abromovic.html?ref=design

OTTO DIX
Always Outrageous, Frequently Disturbing

By ROBERTA SMITH

How German was Otto Dix? The question echoes through the retrospective of Dix's unforgiving art, the first show of its kind ever held in North America, at the Neue Galerie. The answer delivered by this completely engrossing yet sadly flawed exhibition is: deeply, madly, truly.

More than any other artist, Dix made every stop on the itinerary of German modernism, including Realism, Dada, Surrealism, Expressionism and visionary, and he managed it all in one decade, the Roaring '20s. The critic Paul Ferdinand Schmidt — who appears here in a James Ensor-like group portrait from 1923 along with the art dealers Günther Franke and Karl Nierendorf — conjured this whirlwind tour in 1926, when he described how "Dix comes along like a natural disaster: outrageous, inexplicably devastating, like the explosion of a volcano. One never knows what to expect from this wild man."

There are many sides to Dix, the son of an ironworker, whose talent for drawing was spotted early and led to study in an art academy in Dresden, with its great museums. In the 1920s he was invited to paint Hans Luther, a chancellor of the Weimar Republic. But he not only painted very different subjects, like prostitutes and crime scenes, he did so in ways that pushed his materials to the limit. His 1923 watercolor of a brothel matron verges on automatism. Elsewhere he borrowed from folk art, as with the quasi-naïve "Sunday Stroll" (1922) and its nuclear family; its members seem to swing from invisible strings like puppets.

As German painters often still do, Dix believed that the medium's entire history — especially the German part — was available for his use. He painted in the small-brush smooth-surface manner of Albrecht Dürer and looked to Lucas Cranach for inspiration. With contemporaries like Christian Schad, he contributed to a perverse new style of realist painting, called the New Objectivity (Neue Sachlichkeit) that emerged in 1925. By then he had already presented "The Skat Players," a scathing 1920 Cubo-Expressionist collage-painting of postwar German amputees playing cards, at the landmark exhibition that the Dadaists staged in Berlin that year. That work is not here, but a small, bristling, tightly wound study conveys some of its

vehemence; it is, unfortunately, one of the few pencil drawings included in this version of the show, organized with the Montreal Museum of Fine Arts, where it will be somewhat larger.
Dix portrayed a multitude of Germanic types — from stoic farmers to limbs-akimbo Weimar demimondaines — as surely as the German photographer August Sander, often with the same penchant for capturing the Lutheran dignity of his subjects. But Dix, who was born in 1891, 15 years after Sander, and saw action in World War I, tended toward something less generous and more freakish. I doubt that Sander would have considered titling an image "Dedicated to Sadists," as Dix did with a 1922 watercolor. He insinuated all manner of sly caricature, disgust and fury into many of his renderings. In addition to the horribly disfigured faces of war veterans, he also liked to depict, usually in watercolor and ink, the mutilated bodies of murdered women, victims of lustmord, or sexual murder.
There are numerous half-nude female models, signaling an unrepentant, usually unflattering fixation on female breasts; Dix often seems to have equated women with dumbness, whether brute or weak. But he could be intermittently sympathetic, especially concerning the downtrodden or the creative, as evidenced by early portraits like "Working-Class Boy," which calls to mind Alice Neel's paintings, and "Unemployed Man," and by later ones of the poet Iwar von Lücken and the philosopher Max Scheler. A borderline case is the rarely exhibited "Two Children" from 1921, whose subjects seem innocent and open, despite strangely deformed features, and is more Diane Arbus than Neel.
Dix himself, who appears in several photographs early in the exhibition, three taken by his friend Hugo Erfurth and one by Sander himself, looked impeccably German — or Aryan as it would soon be called. A dandyish dresser, he was lean and fair-haired, with high cheek bones and narrow, penetrating eyes. Depending on how he cut and combed his hair, he resembled a Holbein portrait, an international (or Nazi) spy or an ascetic artist.
Dix's self-portraits could flatter. "Self-Portrait with Nude Model" (1923) features a chiseled and smartly clothed Dix with slicked-back hair and at his side a curvy, slightly dopey-looking woman, her hair frazzled — although she has been awarded the luminous eyes of a seer. (So has "Dr. Heinrich Stadelmann" from 1920.) Yet he could also be as hard on himself as on anyone else. In a black-chalk drawing from 1917, he has long, sharp eye-teeth and a demonic vampire look. In "The Artist's Family" (1927), painted a decade later, his wife, daughter and infant son fill the frame, while he seems to intrude from the right, like a handyman with bad teeth who usually keeps to the barn.
As with most German artists of his generation, Dix's formative experience was World War I. He emerged from nearly four years in the trenches physically unscathed but psychically scarred. He attempted exorcism with "Der Krieg" ("The War"), a suite of 50 mostly masterly etchings published by Nierendorf in 1924. They convey a searing sense of the physical horror of war — most prominently wounded and rotting flesh — that remains unmatched in the history of art.
When the Nazis loomed, Dix closed one eye, made satiric references and also turned to images of mothers dandling or nursing infants, although painting women sincerely was hardly his forte. And when the Nazis came to power he was quickly dismissed from his teaching position at the Dresden academy. He was included in the famous 1937 degenerate art exhibition, and the Nazis ultimately impounded 260 of his works from German collections. Dix went into internal exile on Lake Constance. There he took to painting hyper-detailed landscapes that sometimes leaned toward Caspar David Friedrich, sometimes toward Breughel tinged with some of the weirdness of Max Klinger. And he seems to have found religion: the last painting in the show, from 1939, depicts a giant St. Christopher with the Christ child on his shoulder, forging the waters between two shores that might almost have been painted by the 16th-century German Albrecht Altdorfer. He painted until his death in 1969, at the age of 77.
The etchings of "Der Krieg" get the Neue Galerie's Dix retrospective off to a harrowing start. Displayed double-hung in their own gallery, they bear down on us relentlessly. It is a bit like being in the trenches yourself, especially given today's wars in Iraq and Afghanistan.
The prints show us soldiers with prostitutes or with one another, dancing in canteens, crouching in foxholes, clamoring across no man's land, playing cards in the trenches (a sinister depiction of the hierarchy of strong and weak among enlisted men). Most of all Dix delivers the dead and dying in unstinting detail: horrific wounds, landscapes made of bodies and more bodies. Some are strung on barbed wire; others belong to civilians blown out of their beds by aircraft bombs. There are also bones, frozen, clawlike hands and, repeatedly, skulls — dead faces becoming skulls, worm-infested skulls and, in the final print, two skull-heads that seem to be attacking each other, a final testament to the futile unending self-destruction of war. Part of what makes the prints so riveting is their continual experimentation. Nearly every etching shows you a different side of the medium. Especially memorable

is “Mealtime in the Trench,” with its striking contrast of acid-bitten, almost irradiated decay and the dark, densely lined form of a lone soldier.

In terms of intensity and coherence, the “War” is this show’s strongest gallery. There are plenty of riveting works in the rest of the display of course, but they come along one at a time, almost randomly without much sense of structure or curatorial oversight. For example “Memory of the Halls of Mirrors in Brussels,” the show’s only example of Dix’s raging Cubo-Expressionist works from 1920, is crammed into a small dark gallery with the etchings that Dix made prior to “Der Krieg.” It depicts a cackling nude courtesan on the knee of a debauched German soldier; they are highlighted against a silver background that throws no less than six reflections of them from various angles, including one showing the woman’s engorged genitalia.

In many ways Dix looked fresher and more imposing in the “Glitter and Doom” exhibition at the Metropolitan Museum of Art two years ago. He is especially hurt here by a shortage of black- chalk and pencil drawings. But the show might have gained immeasurably from a chronological installation. It would have been shocking to see the hysterical “Memory of the Halls of Mirrors” with Dix’s other paintings from 1919-21, which are the most tender and the most tenderly painted in the show.

One problem is that this exhibition is the first to be organized by Olaf Peters, an art historian at the University Halle-Wittenberg and a scholar in 20th-century German art (although he has overseen an excellent catalog for the show that is now the only full-dress Dix monograph in English that is currently in print).

The larger problem may be the Neue Galerie itself: the limits of its gallery space, a lack of clout that stalls major loans, and perhaps simply the lack of competition where 20th-century German art is concerned. The Neue may be a gift to New York, but it also something of a monopoly, which is never healthy. Dix’s achievement deserves a bigger museum. This show leaves us to piece together his wildness as best we can. There are wonderful rewards, but the first Dix retrospective in North America will also be the last for a while. It should have been overwhelming.

“Otto Dix” continues through Aug. 30 at the Neue Galerie, 1048 Fifth Avenue, at 86th Street; (212) 628-6200, neuegalerie.org.

http://www.nytimes.com/2010/03/12/arts/design/12dix.html?ref=design

'TWILIGHT VISIONS'
Once Shocking, Now Poetic

By KEN JOHNSON

Considering how revolutionary Surrealist photography was in the years before World War II, what with its double-exposing, montaging, solarizing and other techniques, it may seem paradoxical that nostalgia would be the mood suffusing "Twilight Visions: Surrealism, Photography and Paris" at the International Center of Photography. But it makes sense.

For one thing, unlike so much art of that period, it looks truly old-fashioned. Technical innovations have since made possible images more absurd, bizarre and disjunctive than any the original Surrealists could have imagined. And in all the colors of the rainbow. Moreover, changes in popular taste have allowed the production of such outrageously transgressive images that Surrealist ones looks positively decorous — if not innocent — by comparison.

But even then, photographers like Andre Kertesz, Ilse Bing and Man Ray, finding themselves caught in the throes of sweeping change in the cultural capital of the Western world, were as preoccupied with what was being lost as with what might be gained by modernization.

Many photographs in this absorbing show — organized by Therese Lichtenstein, an independent curator, for the Frist Center for the Visual Arts in Nashville, where it had its debut in September — set up poetic contrasts between the new and the old. In a 1934 picture by Bing, the Eiffel Tower soars against the night sky. With electric lights illuminating its corners and clocks on two sides, it is a beacon of futurity. In the left foreground rises the silhouette of an old brick chimney, the sign of a rapidly receding past.

In Kertesz's nocturnal picture of gargoyles crouching on a tower of Notre Dame Cathedral with city lights glowing among buildings in the distance, from 1933, it seems as if beings from an ancient past are meditating ruefully on a present they know is destined for descent into atavistic violence.

Another canonical photograph by Kertesz offers a view through the glass-faced clock of the French Academy in 1932. With its giant Roman numerals layered over the expansive plaza traversed by anonymous pedestrians below, it is the clock of doom, harbinger of the Last Judgment.

Most straight photography registers an instant on the razor-fine edge between the past and the future, but in Surrealism that moment is more metaphorically loaded. The "twilight" of the exhibition's title has as much to do with the mistier regions of consciousness as with the borderlands of real-world time and space.

The Surrealists' enthusiasm for the photographs of Eugène Atget (1857-1927) — who was not himself a Surrealist — was another expression of their preoccupation with time. Between 1897 and his death, Atget devoted himself to documenting the old urban fabric of Paris. His shadowy pictures of cobbled lanes, curious architectural details and merchandise in shop windows — included in the exhibition as well as in a separate display of 31 prints — were discovered by Man Ray and Berenice Abbott in the 1920s. As Ms. Lichtenstein explains in her essay, the Surrealists initially viewed Atget's work not as modern art but as a species of found photography, a kind of outsider art.

Be that as it may, many urban views in the exhibition appear influenced by Atget's somber attentiveness to the city's byways. A nighttime photograph of wet paving stones by Brassaï; a picture of tubas and other brass horns in the window of a musical instrument shop by Dora Maar; a de Chirico-like shot of a statue wrapped in a protective tarp taken by Josef Breitenbach: these images from the 1930s and many others in the show follow in Atget's wandering footsteps.

Pictures of live human subjects are secondary to the cityscapes, but there are some striking examples. Maar's 1930s picture of a half-length nude woman hanging from a trapeze ring by one hand and wearing a Greta Garbo mask is scarily haunting. By comparison, Hans Bellmer's eccentrically pornographic pictures of life-size, anatomically scrambled dolls from 1935 and Kertesz's images of nude women in distorting mirrors from 1933 seem trite.

Maar's touching 1933 portrait of the beautiful painter Leonor Fini dressed in a chorus-girl outfit and holding a long-haired black cat in her lap is one of the few pictures that treats a woman like a human being instead of an erotic fantasy, a semi-abstraction or a freak of the demimonde.

Short Surrealist films are also shown on flat screens or as projections. Some of these are more hair-raising than most of the still photographs. One is "Un Chien Andalou," the notorious 16-minute comic horror movie made in 1929 by Luis Buñuel and Salvador Dalí, in which a man appears to slice open a woman's eyeball with a straight razor; ants crawl out of a hole in another man's palm; and a woman pokes a severed hand in the street with her walking stick. Its hilarious weirdness — surely a major influence on David Lynch — holds up wonderfully today.

"The Vampire," made by Jean Painlevé in 1939, is a horrifying, quasi-educational film about animals that live on the blood of other animals. It devotes most of its length to a South American bat attacking and guzzling the blood of a live guinea pig in a science lab. Sometimes nothing is more surreal than reality itself.

"Twilight Visions: Surrealism, Photography and Paris" runs through May 9 at the International Center of Photography, 1114 Avenue of the Americas, at 43rd Street; (212) 857-0000; icp.org.

http://www.nytimes.com/2010/03/12/arts/design/12twilight.html?ref=design

Museum Sets Grand Stage for Strings and Horns
By DANIEL J. WAKIN

THE oboes and clarinets and flutes and bassoons stand upright, like stalks in a vegetable garden. A motley sisterhood of keyboard instruments — virginals, clavichords, harpsichords — squat on platforms and tables. Curvaceous Strads and voluptuous viols seem to rest seductively against the walls. Oddballs lurk: the sea-dragon-shaped bassoon, the accordion disguised as a cello, the foot-long miniviolins.

All are bathed in a warm light, with spiffy new Ultrasuede backdrops, a cleaned carpet below and freshly painted walls around them.

The Metropolitan Museum of Art recently reopened its André Mertens Galleries for Musical Instruments after eight months. The immediate reason for the closing was roof repairs, but museum officials took advantage of the hiatus to refresh and reconfigure the display of its Western instrument collection. On Saturday three two-hour programs of lectures and demonstrations focusing on early music will highlight the refurbished gallery.

The Met collection, which has been around since 1889, is one of the most important and comprehensive in the world. The gallery, approachable on the second floor through the European paintings section, had not been renovated in 40 years. The metal frames on the display cases were falling off. The spaces were gloomy, a result of makeshift spotlights added when the original fixtures became outmoded.

“What we had was something from the Stone Age,” said J. Kenneth Moore, the curator in charge of musical instruments. “It used to be sort of like a cave.”

Track lights now illuminate the instruments. Curators installed larger labels and new explanatory placards, with additional information about how the instruments work. Some rarely seen items from the collection have been added, while other instruments included over the years have been weeded out to reduce a cluttered effect, Mr. Moore said.

Another part of the collection, housing non-Western instruments grouped by region, remains untouched — dimly lighted and kept in worn cases. A total of 800 instruments are on display in both galleries. Mr. Moore said that he hoped someday to renovate the entire collection, if the money could be raised. He estimated the cost at several million dollars.

Historical musical instruments have long bobbed on the fringe of classical music. Aside from period-instrument performers and many string players, musicians — and listeners — tend to lack expertise in the intricacies of the field. The instruments’ place in museums too is ill defined. They can be objects of high or decorative art but also historical artifacts, examples of technological developments or signposts of anthropology.

For Mr. Moore, unsurprisingly, the study of historical instruments is intrinsic to music. “Without the instruments,” he said, “they couldn’t make the sounds that make you weep.”
Along with the general public, he said, visitors to the exhibit include musicians, makers of period instruments, school groups, musicologists and members of societies devoted to particular instruments.
“We service a lot of different constituencies,” Mr. Moore said. The musical instruments come into play for some of the several dozen little-publicized concerts and demonstrations each year sponsored by the department.
It is a time of some turbulence for instrument collections. Shortly before the Met gallery reopened on March 2, the Victoria and Albert Museum in London closed its musical instrument galleries to create more room for fashion displays, saying it would farm out its collection to other British institutions. The move generated angry petitions and protests among members of Britain’s musical establishment.
Mr. Moore said he wrote a letter calling on the Victoria and Albert to spare the collection. “It’s unfortunate,” he said of the museum’s decision. “They don’t see the value in it. We should be serving the public.”
On the other hand, a major new musical instrument museum with an emphasis on global traditions is opening in Phoenix on April 24. It was founded by the former chairman of Target Corporation, Robert J. Ulrich. Other major collections reside in Berlin, Munich and Brussels.
The Met has 5,000 instruments in its collection. Some 4,000 were donated, starting in 1889, by Mary Elizabeth Brown, whose husband, John Crosby Brown, was a partner in the predecessor to the Brown Brothers Harriman merchant bank. More than 230 instruments are on display in the refurbished Western instrument gallery, many of them recent acquisitions or rarely seen before.
The new items include a narwhal tusk walking stick that triples as an oboe and a flute (pick your end), from 1750 to 1757 and believed to have been owned by Frederick the Great, an accomplished flutist; a double virginal from 1600, a rectangular table-top plucked keyboard instrument, with an elaborate painted depiction of the David and Goliath story on the inside lid; a piano from 1825 to 1832 with the strings contained in a chamber rising up in the shape of a lyre; festooned violas d’amore and English viols.
Other items include Benny Goodman’s last clarinet, a standard Buffet model (“It plays like butter,” said Mr. Moore, a former amateur clarinetist); an ivory clarinet from 1830 with lion heads on the hole covers; and a 1714 Stradivarius cello used by Gregor Piatigorsky.
A 1693 Stradivarius violin, restored to its original configuration, sits next to a 1694 Strad adapted — like most such old instruments — to modern use, with a lengthened fingerboard, a longer neck at a different angle, wire strings, a chin rest and a larger bridge.
A 1670 harpsichord built in Rome, designed by Michele Todini, underwent major restoration.
A jewel of the collection is what the Met says is the oldest existing piano in the world, an instrument built by the piano’s inventor, Bartolomeo Cristofori of Florence, in 1720.
“There are lots of messages in these tubes and keys and skins,” Mr. Moore said.

http://www.nytimes.com/2010/03/12/arts/music/12instruments.html?ref=design

'TO LIVE FOREVER'
Taking It With You in Ancient Egypt

By KEN JOHNSON

You can't take it with you. Or so you think if you are an enlightened citizen of the modern world. All your earthly possessions and attainments aren't going to do you a bit of good after you've gone.

The ancient Egyptians, of course, thought otherwise. They believed that this terrestrial sojourn was only a prologue to the main attraction, the afterlife, and they devoted much of their tremendous creative and technological ingenuity to ensuring that their dead — the wealthy ones, anyway — would have everything needed on the next plane of existence. They pickled the bodies of the deceased, stocked their graves and tombs with food, drink, jewelry, furniture, pets, reading material and whatever else that might come in handy upon awakening in the next dimension.

Whether those efforts paid off for the departed we'll never know, but the collective commitment to postmortal futurity did not prevent the Egyptians from maintaining a powerful, 3,000-year, multidynastic empire. And what they so carefully preserved has been a boon for modern scholars, museums and art lovers, as well as grave robbers and antiquities dealers.

One institution that benefited handsomely is the Brooklyn Museum, which, drawing from its own world-class collection of Egyptian art and artifacts, has assembled an exhibition that explores all facets of the Egyptian funerary industry. Organized by Edward Bleiberg, the museum's curator of Egyptian art, "To Live Forever: Art and the Afterlife in Ancient Egypt" presents more than 100 objects, from massive stone sarcophagus covers and elaborately decorated wooden coffins to statuettes and elegant ink drawings on sheets of papyrus.

Though loaded with arresting items, it is not the most spectacular Egyptian show you'll ever see. But that is beside the point. The works were selected not for their visual and aesthetic virtues but for what they reveal about the beliefs, myths, customs, rituals and economics of caring for the dead.

One of the exhibition's least prepossessing objects is a terra-cotta sarcophagus lid molded rather crudely into a cartoonish, bust-length portrait of a man. Made sometime between 1292 and 1075 B.C., it is like the work of an untrained folk artist imitating the kind of deluxe Egyptian artistry that museums have made more familiar. It is included to demonstrate that the quality of a coffin depended on what the family could afford. Just like today, in ancient Egypt professional coffin makers offered a range of options priced according to the cost of material and labor. Clay, painted to resemble royal sarcophagi, was the material of choice for budget-minded customers.

Another revealing piece, and a more beautiful one, is an 8 ½-inch-tall figure of a man smoothly carved in lustrous dark wood, from about 1400 to 1336 B.C. It is a particularly lovely example of a shabty, a magical servant that would do chores for the deceased in the afterlife. Rich people had many shabties

made of precious materials, including wood, which was a rare commodity. The less fortunate had to settle for shabties made of faience, a glazed earthenware. A picture caption in the excellent catalog explains that while the wealthy might have a different shabty for every day of the year, “40 shabties were an ideal number to own in the Ramesside Period” because that provided “enough workers for each of the 30 days of the month plus overseers and foremen.”

Faience pieces did not necessarily look cheap, however, so rich as well as poor had shabties made from it. Among the exhibition’s most striking objects is a weird jade-green faience sculpture less than three inches high representing a dwarf standing with each foot on the head of an alligator and each hand gripping a snake by the neck. Identified as Pataikos or a form of the dwarf-god Bes, this little fellow was put into a tomb to protect the dead.

One topic that many viewers will want to know about is mummification, a subject not easily represented visually. There is one mummy on view, that of a man named Demetrios that dates from 95 – 100 C. E. He is so heavily wrapped in fabric that his corpse is not visible, but a remarkably sensitive, Roman-style portrait painted in encaustic on a wooden panel is attached where his head would be, and hi-tech imaging scans, also in the exhibition, reveal the body within. A text panel explains in detail how bodies were preserved and in so doing emphasizes one of the show’s main points: Even mummy-makers offered differently priced services. The most expensive process was to have organs harvested and put in vessels, or canopic jars, for preservation and then returned to the abdominal cavity after the body had been soaked in brine for 70 days. The brain was extracted through the nose, using a metal hook.

Middle-income people had their innards liquefied by injected cedar-tree oil and drained through the rectum, also after 70 days in saltwater. The cheapest method was to give the body an enema before its 70-day immersion. Finally, the embalmer would wrap the corpse in bandages and return it to the family for placement in a coffin and ultimate entombment.

In his eminently readable essay, Mr. Bleiberg goes into detail about mummification, its history and other Egyptian funerary customs. In a second, equally interesting essay called “How Much Did a Coffin Cost? The Social and Economic Aspects of the Funerary Arts in Ancient Egypt,” the Egyptologist Kathlyn M. Cooney analyzes data to show that every element in a tomb — including the sarcophagus, canopic jars, shabties, baskets, chests and much more — had its conventional price. The Egyptians, it seems, were nothing if not pragmatic.

A larger point made by Ms. Cooney is that contrary to the impression given by major museum collections, very few Egyptians could afford a coffin, much less a tomb and related accouterments. Because of the expense there was a thriving market in secondhand coffins, obtained most likely from grave robbers. An example in the exhibition is identified as “Coffin of the Lady of the House, Weretwahset, Reinscribed for Bensuipet” (from about 1292 to 1190 B.C.). The painted wooden container’s lid is carved in the form of a regal young woman. Examination of its hieroglyphic inscriptions proves that Bensuipet’s name was written over Weretwahset’s.

Ms. Cooney likens Egyptian funerals to modern weddings as events designed to display the power and prestige of the celebrants. Religion may have determined iconography, she notes, but “social and economic factors dictated the quality, size, materials and style of every funerary object produced in ancient Egypt.” Some things never change.

“To Live Forever: Art and the Afterlife in Ancient Egypt” continues through May 2 at the Brooklyn Museum, 200 Eastern Parkway, at Prospect Park; (718) 638-5000, brooklynmuseum.org.

An earlier version of this review referred incorrectly to the presence of mummies in the exhibition. There is in fact one on display.

http://www.nytimes.com/2010/03/12/arts/design/12ancient.html?ref=design

In Archive and Exhibit, the Dead Live On
By LARRY ROHTER

The Grateful Dead performed the last of their more than 2,300 concerts in 1995 and thus belong increasingly to history, not the present. Two related events make that reality clear: a new exhibition about the band that has just opened at the New-York Historical Society and the recent creation of the much larger archive, housed at the University of California, Santa Cruz, from which it is drawn.

"The Grateful Dead: Now Playing at the New-York Historical Society," which continues through July 4, includes only a tiny part of the material that the band donated to the university in 2008. But as the first large-scale public showing of artifacts from the collection, it offers a tantalizing glimpse of material that is stirring the interest not just of hard-core Deadheads but also of scholars.

The items on display include instruments, letters from Deadheads, memos from the band's business meetings, newsletters, concert programs and T-shirt designs. There is also a rare original poster from one of Ken Kesey's mid-1960s Acid Tests, and even the 1968 letter in which Warner Brothers Records renewed the band's recording contract, with a paltry 8 percent royalty rate for domestic releases (and 5 percent abroad).

Though the Grateful Dead were based in the San Francisco Bay area and were closely identified with the psychedelic movement that emerged in the mid-1960s there, Louise Mirrer, president of the historical society, justified the exhibition by referring to the band's "great New York pedigree." The Dead first played New York City in June 1967 and went on to perform here more than 150 times, including many shows at the Fillmore East, which Ms. Mirrer called "the band's home away from home."

The larger archive at the university, which has received a $615,000 grant from the federal government's Institute of Museum and Library Services but is looking for additional financing, will have both a physical and an online presence. But even before the archive is fully mounted, the historians, sociologists, anthropologists, theologians, musicologists and other academic researchers who make up the growing field known as Grateful Dead Studies are eager to plunge in.

"We're ecstatic with anticipation," said Nicholas Meriwether, editor of "All Graceful Instruments: The Contexts of the Grateful Dead Phenomenon" and a historian at the University of South Carolina. "That archive is a remarkable window not just into Haight-Ashbury and the dawn of the modern rock theater, but to all the documentary evidence and heritage of the counterculture and all the issues historians are concerned about in discussing the 1960s."

The archive was one of the subjects talked about last month when the Grateful Dead Scholars Caucus convened in Albuquerque for its 13th annual meeting. In a journal called Dead Letters some of the researchers have also published essays with titles like "The Taoist Perspective in 'Weather Report Suite,' " and "How the Music Played the Band: Grateful Dead Improvisation and Merleau-Ponty."

"If I were starting out, I'd find the archive to be amazing as a way to bring a fresh eye and new perspective to what happened," said Rebecca G. Adams, a sociologist at the University of North Carolina at Greensboro who has been researching the Deadhead phenomenon for more than two decades. "There are millions of projects people could do."

In addition business scholars and executives are starting to regard the Dead's business model as worthy of examination. This month's issue of The Atlantic includes an article called "Management Secrets of the Grateful Dead," and band members have recently appeared on cable television business channels to discuss their consensus-based management style.

"They had a brilliant business acumen without being business people, and may have been the most egalitarian business organization ever," said Barry Barnes, a Deadhead and professor at Nova Southeastern University's school of business and entrepreneurship in Fort Lauderdale, Fla. "They are credited with inventing viral marketing, and with their emphasis on superior customer value and use of technology, long before the Internet, they were in tune with a lot of practices we see now."

Like so many other things related to the Grateful Dead, though, the archive is largely the product of happenstance, not design. Early on, the band hired a veteran of the Acid Tests, Eileen Law, as a liaison to its fans, and she made a point of preserving what other musical groups of the era would have considered ephemera.

"Eileen saved everything and was extremely methodical," said Dennis McNally, author "A Long Strange Trip: The Inside History of the Grateful Dead" and the band's longtime publicist. "She began as the ministering mother to all Deadheads, the voice on the answering machine, but she became the keeper of stuff, and that all this marvelous material is there is to her credit."

After Jerry Garcia, a founder of the band and its lead guitarist, died in 1995, the group gradually wound down its business affairs, a process that lasted well into the next decade. Fredric Lieberman, chairman of the music department at the Santa Cruz campus, had traveled with the band and worked with Mickey Hart, one of the band's drummers, on some projects, including a pair of books. He was aware of the extent of the material Ms. Law had collected and thought that scholars would find it useful — if it could be preserved.

"It was taking up a lot of space in a storage area in Marin, and it looked like they were just going to throw it away," Mr. Lieberman said. "I basically said that I didn't care where the archive went so long as it was maintained and not dispersed. Mickey thought first of the Library of Congress, since he's on the board there, but given all the other things they have to do, their budget didn't seem conducive to the kind of cataloging that was going to be required."

Other universities besides Santa Cruz were also contacted and expressed interest in the archive, among them Stanford. But in the end band members decided they "wanted to go to a public institution because the whole idea of it being public and free was important to them," said Christine Bunting, the director of special collections and archives at the Santa Cruz university's library.

What remains unclear, however, is to what extent, the archive will be able to make available what is probably the band's most valuable asset: its own recordings of three decades of live shows.

"We're not going to be doing anything that people haven't heard anywhere else," Ms. Bunting said. "That doesn't mean people can't come here and listen, because we will have music playing. But we're not competing with their business."

The university is now engaged, though, in digitizing much of the other material, including documents and photographs. The plan is to make as much as possible available online through what is being called Virtual Terrapin Station, a name taken from a 1977 album, where Deadheads past and future not only can come to look but also can donate items and ideas of their own.

"I always knew what this was worth — the artwork, the guest lists and all the other things the crew brought back from the road," Ms. Law said in a telephone interview. "It was just something that came naturally to me. People in the office would say, 'We don't need this stuff, get rid of it,' and instead I would hide it all. So I'm just so happy that it has found a home, the right home."

http://www.nytimes.com/2010/03/11/arts/music/11grateful.html?ref=design

An Italian Antihero's Time to Shine
By MICHAEL KIMMELMAN

ROME — By at least one amusing new metric, Michelangelo's unofficial 500-year run at the top of the Italian art charts has ended. Caravaggio, who somehow found time to paint when he wasn't brawling, scandalizing pooh-bahs, chasing women (and men), murdering a tennis opponent with a dagger to the groin, fleeing police assassins or getting his face mutilated by one of his many enemies, has bumped him from his perch.

That's according to an art historian at the University of Toronto, Philip Sohm. He has studied the number of writings (books, catalogs and scholarly papers) on both of them during the last 50 years. Mr. Sohm has found that Caravaggio has gradually, if unevenly, overtaken Michelangelo.
He has charts to prove it.
The change, most obvious since the mid-1980s, doesn't exactly mean Michelangelo has dropped down the memory hole. To judge from the throngs still jamming the Sistine Chapel and lining up outside the Accademia in Florence to check out "David," his popularity hasn't dwindled much.
But, charts or no charts, Mr. Sohm has touched on something. Caravaggiomania, as he calls it, implies not just that art history doctoral students may finally be struggling to think up anything fresh to say about Michelangelo. It suggests that the whole classical tradition in which Michelangelo was steeped is becoming ever more foreign and therefore seemingly less germane, even to many educated people. His otherworldly muscle men, casting the damned into hell or straining to emerge from thick blocks of veined marble, aspired to an abstract and bygone ideal of the sublime, grounded in Renaissance rhetoric, which, for postwar generations, now belongs with the poetry of Alexander Pope or plays by Corneille as admirable but culturally remote splendors.
Caravaggio, on the other hand, exemplifies the modern antihero, a hyperrealist whose art is instantly accessible. His doe-eyed, tousle-haired boys with puffy lips and bubble buttocks look as if they've just tumbled out of bed, not descended from heaven. Coarse not godly, locked into dark, ambiguous spaces by a strict geometry then picked out of deep shadow by an oracular light, his models come straight off the street. Cupid is clearly a hired urchin on whom Caravaggio strapped a pair of fake wings. The angel in his "Annunciation" dangles like Chaplin's tramp on the high wire in "The Circus," from what must have been a rope contraption Caravaggio devised.

Rome's art establishment at the turn of the 17th century, immersed in the mandarin froufrou of Late Mannerism, despised Caravaggio for the filthy, barefoot pilgrims he painted at Mary's doorstep. Out to "destroy painting," as Nicolas Poussin, the most high-minded of all French artists, saw it, Caravaggio connected with ordinary people, the ones who themselves arrived barefoot and filthy as pilgrims in Rome. And fortunately for Caravaggio, he also appealed to a string of rich and powerful patrons.

But almost immediately after he died from a fever at 38, in 1610, on the beach at Porto Ercole, north of Rome, his art was written off by critics as a passing fad and neglected for hundreds of years, setting the stage for his modern resurrection. Connoisseurs like Bernard Berenson were still dismissing his work a century ago when Lionello Venturi, Roger Fry and Roberto Longhi, among others, finally revived his reputation as a protomodernist.

Mr. Sohm, who announced his findings during a talk at the College Art Association conference in Chicago last month, focused on publications, not tourist revenues or exhibition attendance figures, and his study says nothing about how Michelangelo and Caravaggio stack up against box-office greats like Rembrandt and van Gogh.

But his research does corroborate evidence plain to anybody in or out of art academe or who has browsed for scarves in Italian airports where motifs of Caravaggio's "Bacchus" and head of Goliath have become as ubiquitous as coasters bearing bits of David's anatomy and mugs with the figure of Adam from the Sistine ceiling. Caravaggios are now used to decorate the cover of "Emerging Infectious Diseases," a medical journal, and to advertise a sex shop in London.

"The only way to understand old art is to make it participate in our own artistic life" is how Venturi phrased it in 1925. That Caravaggio left behind no drawings, no letters, no will or estate record, only police and court records, makes him a perfect Rorschach for our obsessions. He was outed in the 1970s by gender studies scholars, notwithstanding the absence of documents to indicate he was gay. Pop novelists and moviemakers have naturally had a field day with his life. Exhibition organizers cook up any excuse ("Caravaggio-Bacon," "Caravaggio-Rembrandt") to capitalize on his bankability. Newly discovered "Caravaggios" test the market every year.

Not long ago, two Caravaggios turned up in the French village of Loches in the Loire Valley, under the organ loft of a local church. Never mind that various Caravaggio experts have since doubted the pictures are by him: Loches is advertising itself as a Caravaggio town. And officials in Porto Ercole lately said his lost remains had been found in an underground ossuary, pending DNA tests with descendants of his brother, who still live near Milan. The iconoclast is even being turned into a religious icon, it seems: Caravaggio's "bones" may soon become holy relics for art pilgrims.

Another Caravaggio retrospective has also opened, here at the Quirinale: two dozen paintings, on view through June 13, a blue-chip survey, installed ridiculously in darkened rooms with spotlights, as if his art needed more melodrama. But the pictures are glorious anyway. The exhibition is mobbed.

It happens that a show of Michelangelo's drawings is at the Courtauld Gallery in London, through May 16. Gifts for a beautiful young Roman nobleman, Tommaso de' Cavalieri, on whom Michelangelo had developed a crush, the drawings were ostensibly supposed to help Cavalieri learn to draw. Imagine Roger Federer handing you a DVD of himself at Wimbledon, saying "Just do this." These are drawings of the most arcane refinement, unearthly beautiful.

By contrast, Caravaggio, wrestling art back to the ground, distilled scenes into a theatrical instant at which time seems suddenly stopped. That's why his pictures can bring to mind movie stills. The art historian Michael Fried, who has just written a book about Caravaggio, notes the quality of the figures' absorption. Life-size images, they share our space and we theirs, face to face, as another art historian, Catherine Puglisi, has pointed out (something that doesn't happen with Michelangelo's enormous sculptures or his frescoed ceiling that we only see from far away). The immediacy somehow dovetails with the tabloid tawdriness of his biography, with the whole modern celebrity drama.

The other afternoon endless scrums of tourists here jostled before the Caravaggios in the Church of San Luigi dei Francesi and the Basilica of Santa Maria del Popolo, feeding pocket change into the boxed light meters. It was probably just coincidental, but in the Church of Santa Maria sopra Minerva, nobody stopped to look at the Michelangelo.

http://www.nytimes.com/2010/03/10/arts/design/10abroad.html?ref=design

In Cancer Fight, Teenagers Don't Fit In

By RONI CARYN RABIN

Simone Weinstein's ordeal with cancer started in the most banal way: she was tired. She had a hard time getting up in the morning, and did not even have the energy to hang out with her friends.

But Simone was 14. Her mother thought she was just a typical teenager.

"She'd say, 'I don't know what to do with you,' " said Miss Weinstein, now a 20-year-old student at Whittier College in California, who was finally given a diagnosis of the blood cancer called acute lymphoblastic leukemia. "She thought I was being a normal, somewhat lazy, silly teenager."

That is not unusual, even though 1 in 333 children develops a malignancy by age 20, and the disease leads to more deaths in the 15-to-19 age group than any other single illness.

Experts say that since teenagers tend not to ask adults for help or confide about embarrassing physical changes, they are likely to receive their diagnoses much later in the course of their illness than younger children. And that usually means they will require more aggressive and protracted treatments that can lead to lifelong side effects.

While overall survival rates are as high as 70 to 80 percent, depending on the type of cancer, teenagers have not benefited from the huge advances in survival made by younger children and much older adults in recent decades. They are also far less likely to participate in clinical trials, which offer the most up-to-date therapies: Fewer than one in five adolescents with cancer are treated in a clinical trial, according to some estimates, compared with well over half of younger children.

Some basic questions about cancer in teenagers remain unresolved, including where it should be treated — in pediatric medical centers, along with toddlers, or in adult settings that follow protocols tested on significantly older patients?

And teenagers tend to develop a very different set of cancers from older adults. The most common are leukemias, lymphoma, cancers of the reproductive tract, brain tumors and sarcomas — cancers of the muscle and connective tissue that are often misidentified as sports injuries.

"Teenagers fall into a cancer gap — a real no-man's land," said Dr. W. Archie Bleyer of the St. Charles Medical Center in Bend, Ore., an expert on cancer in teenagers who was the keynote speaker at a conference on the subject last month in Phoenix at the Wellness Community-Arizona, an affiliate of the international group Cancer Support Community. "The 14-, 15- or 16-year-olds need psychosocial support, which they're not going to get if they're in an adult hospital."

Teenagers treated at pediatric medical centers are far more likely to be enrolled in a clinical trial, Dr. Bleyer said, but he added, "Depending on the cancer, some are better off being treated at the adult center."

The Arizona group started offering year-round social support to teenagers several years ago, after being approached by Heather Bongiolatti, a local high school student with non-Hodgkin's lymphoma.

She had tried support groups both for adults and for children, but neither quite fit the bill, she said in an interview, adding: "Most of the adults were parents of children with cancer. And the groups for kids were doing drawing and making crafts. I was 15, I didn't want to do that."

But she desperately needed a social outlet. Though two close friends stuck with her through her illness, most of her peers "dropped me off the side of the earth," she said, acting as if they did not even know her when she returned to school after missing most of 9th and 10th grades.

Now 22, Miss Bongiolatti says most of her peers are graduating from college and getting on with their lives, while she has had to put hers on hold because of serious bone problems resulting from her cancer medications. She is unable to drive and has had nine operations in the past few years, including three hip replacements.

Gina DeGraw, a clinical social worker who runs a cancer survivors' clinic for teenagers at Phoenix Children's Hospital, said that while there is no good time in life to get cancer, the adolescent years may be among the hardest.

"The typical teen is seeking independence, and all of a sudden gets this diagnosis and guess what: they have to be dependent again," she said. "They have all the angst of teenagers, and they have to deal with issues most adults don't have to deal with, like contemplating the loss of their fertility."

Not to mention their appearance. "Just when they want to look most attractive, they're getting bloated and losing their hair" from radiation, chemotherapy and steroids, Mrs. DeGraw said.

Teenagers can also lose health insurance when they age out of family or government plans at 18 or 19, or if they have to withdraw from college for medical reasons.

They may not be the best patients, either, doctors say, and may have a hard time sticking to long and grueling courses of treatment. Many of these concerns were identified in a report issued jointly in 2006 by the National Cancer Institute and the Lance Armstrong Foundation. That report, which grouped adolescents with adults in their 20s and 30s, noted that this entire population "has seen little or no improvement in cancer survival rates in decades."

That report led to the development of treatment programs focusing on the specific needs of adolescents and young adults. For example, the Knight Cancer Institute in Oregon has a multidisciplinary program that consults with pediatric and adult oncologists about available clinical trials and includes support

services for its young patients, said Dr. Brandon Hayes-Lattin, medical director of the institute's adolescent and young adult oncology program.

Clinical trials for this age group have led to some breakthroughs — especially when it comes to acute lymphoblastic leukemia, the form of cancer Simone Weinstein had, said Dr. Crystal L. Mackall, chief of the pediatric oncology branch of the National Cancer Institute.

Teenagers with this type of leukemia, often called A.L.L., do not fare as well as younger children with what appears to be the exact same disease, a discrepancy that has baffled oncologists. But when researchers compared teenagers treated by pediatric oncologists with those treated by adult cancer doctors, they found that the first group did remarkably better.

"When we saw the differences, I was floored," said Dr. Wendy Stock, director of the leukemia program at the University of Chicago Medical Center. "It wasn't a subtle 5-percentage-point difference, but a 30-percentage-point difference in survival."

Now the pediatric protocol is being offered to teenagers through clinical trial sites. Dr. Stock and others are trying to figure out what factors are responsible for the better outcomes, and whether the greater survival is because of the treatment protocol itself or other factors, like the more structured environment of a pediatric center or pediatric oncologists' greater familiarity with A.L.L.

There may even be subtle differences between the type of teenager or young adult who is referred to a pediatric center and the one who goes to an adult oncologist. Many of the drugs for this type of leukemia are oral ones taken at home, and require strict adherence for an extended period. "The adolescent or young adult who comes to a pediatrician probably comes with their mom, and Mommy is going to make them take the drugs."

http://www.nytimes.com/2010/03/16/health/16canc.html?nl=health&emc=healthupdateema1

Nutrition: Rise in Soda Price Linked to Better Health

By RONI CARYN RABIN

New research provides evidence that proposed taxes on soft drinks may make young people healthier.

The study, which collected food intake data from 12,123 young adults for 20 years, found that with every 10 percent increase in the price of a two-liter bottle, people consumed 7 percent fewer calories from soda. They also took in fewer calories over all.

When people faced an even larger increase — $1 for a two-liter bottle of soda, comparable to a proposed tax in Philadelphia — they consumed 124 fewer calories a day, the study found. The lower soda intake was associated with a drop in weight of more than two pounds — and a lower risk for pre-diabetes. The studyappears in the March 8 issue of Archives of Internal Medicine.

Maureen L. Storey, senior vice president for science policy at the American Beverage Association, said taxing soda would be discriminatory as well as ineffective. “Taxes do not make people healthier,” she said. “Making smart education decisions about diet and exercise do.”

But the study’s lead author, Barry M. Popkin, an obesity specialist at the Gillings School of Global Public Health at the University of North Carolina, said the study would help answer an important question.

“You always know that if you reduce the cost or increase the cost of something, consumption of that item will change,” Dr. Popkin said. “What we don’t know is whether you will buy something equally bad or worse. In this case, we found that people would get healthier.”

http://www.nytimes.com/2010/03/16/health/research/16nutr.html?ref=research

Rays of Hope in Battling an Agonizing Disease

By SABIN RUSSELL

It wasn't until Ileana Peralta was in junior high school that she summoned the courage to Google her own disease.

The teenager from Livermore knew almost everything about her inherited condition, Epidermolysis bullosa, a tongue twister even doctors call just EB. The disease is caused by the lack of the collagen gene that makes the glue that tethers layers of skin together. It makes her skin seem as fragile as a butterfly's wing.

Ileana and other children with EB go through life with much of their bodies wrapped in gauze, like a burn patient. Their skin, at the slightest trauma, is prone to form blisters, which are vulnerable to infection. Scarring eventually curls fingers and toes, fusing them. To varying degrees, these children are condemned to a life of pain and disfigurement.

EB is rare. Ileana's severe form of it, called recessive dystrophic, affects between one and four per one million in the United States, said Dr. Alfred T. Lane, a pediatric dermatologist. Dr. Lane was recruited to Stanford University Medical School 19 years ago to search for treatments for EB, and has been working on it ever since.

"It's the worst skin disease that I know of," he said. "This disease just cries out for help."

The handful of doctors in the United States who deal with EB are experimenting with some of the most advanced technologies in medicine — gene therapy, stem cell therapy and bone marrow transplantation — as a means of eventual treatment.

Last fall, the California Institute of Regenerative Medicine, the state agency that runs the voter-approved $3 billion stem cell research program, allotted $11.7 million to Stanford to find a way to harness the newest stem cell technologies against EB. The goal is a clinical trial by 2014.

Under Dr. Lane's direction, the California stem cell money will pay for an approach using new techniques that transform ordinary skin cells into all-purpose stem cells. In theory, these stem cells can be

engineered to carry the missing collagen gene, and can then be coaxed to grow large amounts of healthy skin grafts, immunologically compatible with each patient, like Ileana.

When Ileana trolled the Web for information about her disease, she discovered that children who have it may not survive to adulthood. “The part that scares me is that some kids died from it,” she said. “I’m glad I’m still here.”

For most of Ileana’s life, Dr. Lane’s team has focused on developing gene therapy. The idea is to implant the missing gene — for a protein called collagen VII — in skin grafts. The chainlike collagen proteins, absent or damaged in people with EB, anchor the top layer of skin to the underlying dermis.

Engineered viruses would ferry the missing gene to laboratory cultures of the patient’s skin, to be grown in sheets and later grafted. A clinical trial among adult patients is pending.

The latest technique, sometimes called reprogramming, holds the promise of sidestepping the troublesome issues surrounding the use of embryonic stem cells — controversial because they are derived from human embryos that are destroyed a few days after fertilization.

Reprogramming seemed like science fiction until 2006, when Dr. Shinya Yamanaka proved it could be done in mice. In 2007, Dr. Yamanaka and other researchers showed it could be done with human cells.

Reprogrammed cells are currently too dangerous for use in human studies, and a variety of hurdles must be cleared before such studies can happen. One study recently found, for example, that reprogrammed cells have a more limited lifespan than stem cells derived from embryos.

On the other hand, researchers are rapidly fine-tuning the mechanisms of cellular reprogramming, making it simpler, more efficient and better understood. The field is now among the hottest in molecular biology.

More controversial is an entirely different approach using bone marrow transplants, which swap a patient’s own marrow with those of a healthy donor. The idea is to treat EB as a disease of the whole body, rather than one that can be repaired with skin grafts. EB affects not only the skin, but also weakens mucosal tissues in the mouth and gut, which cannot be grafted.

Dr. John E. Wagner Jr., a pediatric cancer researcher at the University of Minnesota Medical School, has done bone marrow transplants on seven EB children after studies on mice that showed that a select group of bone marrow cells could migrate to the skin and, for reasons not fully understood, replace missing collagen.

Four of those patients “are having improved quality of life,” said Dr. Wagner, who has yet to publish his pediatric results. But two of the children died — one from infections five months after an initial transplant, and the other during chemotherapy, before healthy bone marrow from a donor could be transplanted.

Dr. Wagner agonizes over those deaths, but is convinced that the disease was so severe that it warranted the risk.

“I normally take care of patients with leukemia,” he said, “but then I think there are some things worse than leukemia.”

Dr. Wagner’s work is backed by DebRA, the Dystrophic Epidermolysis Bullosa Research Association of America, as well as the Epidermolysis Bullosa Medical Research Foundation, two charitable organizations founded by parents.

Dr. Lane of Stanford has reservations about the bone marrow procedure. “For a child with large wounds,” he said, “you are really setting them up for infection.”

Dr. Arthur Caplan, a bioethicist at the University of Pennsylvania, is also uneasy about conducting risky procedures on children.

“The sicker the children become, the harder it is to secure good, informed consent,” Dr. Caplan said. “In my experience, parents become desperate. They want to have hope, and often researchers want to offer hope.”

For her part, Ileana said she was in no hurry to be a guinea pig. “I probably want to wait until they know what they are doing,” she said.

Now 15 and a freshman at Grenada High in Livermore, Ileana confronts her disease with a combination of pluck and a straightforward attitude befitting someone considerably older. She is as matter-of-fact about everyday life as she is about her disease. She confesses to struggling in math at school and far prefers drawing. Her sketchbook is full of cartoon bats and characters like Jack Skellington from “The Nightmare Before Christmas” and SpongeBob SquarePants.

Ileana knows the sting of EB every day when her mother, Stephanie Peralta, bathes her and wraps her in gauze. It can take 45 minutes to whirl the yards of white cotton bandage around her arms, her legs and her stomach. Some days the sores hurt more than others. Some days they hardly bother her at all.

Bandaging Ileana is a labor of love for Ms. Peralta, a 31-year-old single mother, who lost her job at a freight forwarding company when the recession hit. She was 16 when she became pregnant with Ileana. Doctors knew when Ileana was born that something was wrong: on her right leg, there was no skin from the knee down.

“I was a teenage mom with a sick child,” Ms. Peralta said. “I grew up in a hurry, and just dealt with it.”

Ileana appears to have inherited her mother’s strength. “I just try to get through it, the best you can, no matter how much it hurts,” she said.

When she goes outside, she knows people sometimes stare. “If they’re curious, they’ll ask,” she said. “It’s O.K. to ask.”

Recently she attended a party, and met a girl whose mother has cancer. “I asked her about it,” she said. “Pretty soon we were swapping stories.”

http://www.nytimes.com/2010/03/14/health/14sfblister.html?ref=research

Disease Cause Is Pinpointed With Genome

By NICHOLAS WADE

Two research teams have independently decoded the entire genome of patients to find the exact genetic cause of their diseases. The approach may offer a new start in the so far disappointing effort to identify the genetic roots of major killers like heart disease, diabetes and Alzheimer's.

In the decade since the first full genetic code of a human was sequenced for some $500 million, less than a dozen genomes had been decoded, all of healthy people.

Geneticists said the new research showed it was now possible to sequence the entire genome of a patient at reasonable cost and with sufficient accuracy to be of practical use to medical researchers. One subject's genome cost just $50,000 to decode.

"We are finally about to turn the corner, and I suspect that in the next few years human genetics will finally begin to systematically deliver clinically meaningful findings," said David B. Goldstein, a Duke University geneticist who has criticized the current approach to identifying genetic causes of common diseases.

Besides identifying disease genes, one team, in Seattle, was able to make the first direct estimate of the number of mutations, or changes in DNA, that are passed on from parent to child. They calculate that of the three billion units in the human genome, 60 per generation are changed by random mutation — considerably less than previously thought.

The three diseases analyzed in the two reports, published online Wednesday, are caused by single, rare mutations in a gene.

In one case, Richard A. Gibbs of the Baylor College of Medicine sequenced the whole genome of his colleague Dr. James R. Lupski, a prominent medical geneticist who has a nerve disease, Charcot-Marie-Tooth neuropathy.

In the second, Leroy Hood and David J. Galas of the Institute for Systems Biology in Seattle have decoded the genomes of two children with two rare genetic diseases, and their parents.

More common diseases, like cancer, are thought to be caused by mutations in several genes, and finding the causes was the principal goal of the $3 billion human genome project. To that end, medical geneticists have invested heavily over the last eight years in an alluring shortcut.

But the shortcut was based on a premise that is turning out to be incorrect. Scientists thought the mutations that caused common diseases would themselves be common. So they first identified the common mutations in the human population in a $100 million project called the HapMap. Then they compared patients' genomes with those of healthy genomes. The comparisons relied on ingenious devices called SNP chips, which scan just a tiny portion of the genome. (SNP, pronounced "snip," stands for single nucleotide polymorphism.) These projects, called genome-wide association studies, each cost around $10 million or more.

The results of this costly international exercise have been disappointing. About 2,000 sites on the human genome have been statistically linked with various diseases, but in many cases the sites are not inside working genes, suggesting there may be some conceptual flaw in the statistics. And in most diseases the culprit DNA was linked to only a small portion of all the cases of the disease. It seemed that natural selection has weeded out any disease-causing mutation before it becomes common.

The finding implies that common diseases, surprisingly, are caused by rare, not common, mutations. In the last few months, researchers have begun to conclude that a new approach is needed, one based on decoding the entire genome of patients.

The new reports, though involving only single-gene diseases, suggest that the whole-genome approach can be developed into a way of exploring the roots of the common multigene diseases.

"We need a way of assessing rare variants better than the genomewide association studies can do, and whole-genome sequencing is the only way to do that," Dr. Lupski said.

With 10 genomes of healthy humans sequenced, Dr. Gibbs, a specialist in DNA sequencing, decided it was time to decode the genome of someone with a genetic disease and asked his colleague Dr. Lupski to volunteer.

Mutations in any of 39 genes can cause Charcot-Marie-Tooth, a disease that impairs nerves to the hands and feet and causes muscle weakness.

Fifty thousand dollars later, Dr. Lupski turned out to have mutations in an obscure gene called SH3TC2. The copy of the gene he inherited from his father is mutated in one place, and the copy from his mother in a second.

Both his parents had one good copy of the gene in addition to the mutated one. A single good copy can generate enough, or nearly enough, of the gene's product for the nerves to work properly. Dr. Lupski's mother was free of the disease and his father had only mild symptoms.

In the genetic lottery that is human procreation, two of their eight children inherited good copies of SH3TC2 from each parent; two inherited the mother's mutation but the father's good copy and are free of the disease; and four siblings including Dr. Lupski inherited mutated copies from both parents. These four all have Charcot-Marie-Tooth disease. The results are reported in The New England Journal of Medicine.

In Seattle, Dr. Hood and Dr. Galas have also applied whole-genome sequencing to disease. They analyzed the genome of a family of four, in which the two children each have two single-gene diseases, called Miller syndrome and ciliary dyskinesia. With four related genomes available, the researchers could

identify the causative genes. They also improved the accuracy of the sequencing because DNA changes that did not obey Mendel's rules of inheritance could be classed as errors in the decoding process.

The Seattle team believes whole-genome sequencing can be applied to the study of the common multigene diseases and plans to sequence more than 100 genomes next year, starting with multigenerational families.

The family whose genomes they report in Science were sequenced by a company with a new DNA sequencing method, Complete Genomics of Mountain View, Calif., at a cost of $25,000 each. Clifford Reid, the chief executive, said that the company was scaling up to sequence 500 genomes a month and that for large projects the price per genome would soon drop below $10,000. "We are on our way to the $5,000 genome," he said.

Dr. Reid said the HapMap and genomewide association studies were not a mistake but "the best we could do at the time." But they have not yet revolutionized medicine, "which we are on the verge of doing," he said.

Dr. Goldstein, of Duke University, said the whole-genome sequencing approach that was now possible should allow rapid progress. "I think we are finally headed where we have long wanted to go," he said.

http://www.nytimes.com/2010/03/11/health/research/11gene.html?ref=research

A Host of Mummies, a Forest of Secrets

By NICHOLAS WADE

In the middle of a terrifying desert north of Tibet, Chinese archaeologists have excavated an extraordinary cemetery. Its inhabitants died almost 4,000 years ago, yet their bodies have been well preserved by the dry air.

The cemetery lies in what is now China's northwest autonomous region of Xinjiang, yet the people have European features, with brown hair and long noses. Their remains, though lying in one of the world's largest deserts, are buried in upside-down boats. And where tombstones might stand, declaring pious hope for some god's mercy in the afterlife, their cemetery sports instead a vigorous forest of phallic symbols, signaling an intense interest in the pleasures or utility of procreation.

The long-vanished people have no name, because their origin and identity are still unknown. But many clues are now emerging about their ancestry, their way of life and even the language they spoke.

Their graveyard, known as Small River Cemetery No. 5, lies near a dried-up riverbed in the Tarim Basin, a region encircled by forbidding mountain ranges. Most of the basin is occupied by the Taklimakan Desert, a wilderness so inhospitable that later travelers along the Silk Road would edge along its northern or southern borders.

In modern times the region has been occupied by Turkish-speaking Uighurs, joined in the last 50 years by Han settlers from China. Ethnic tensions have recently arisen between the two groups, with riots in Urumqi, the capital of Xinjiang. A large number of ancient mummies, really desiccated corpses, have emerged from the sands, only to become pawns between the Uighurs and the Han.

The 200 or so mummies have a distinctively Western appearance, and the Uighurs, even though they did not arrive in the region until the 10th century, have cited them to claim that the autonomous region was always theirs. Some of the mummies, including a well-preserved woman known as the Beauty of Loulan, were analyzed by Li Jin, a well-known geneticist at Fudan University, who said in 2007 that their DNA contained markers indicating an East Asian and even South Asian origin.

The mummies in the Small River Cemetery are, so far, the oldest discovered in the Tarim Basin. Carbon tests done at Beijing University show that the oldest part dates to 3,980 years ago. A team of Chinese geneticists has analyzed the mummies' DNA.

Despite the political tensions over the mummies' origin, the Chinese said in a report published last month in the journal BMC Biology that the people were of mixed ancestry, having both European and some Siberian genetic markers, and probably came from outside China. The team was led by Hui Zhou of Jilin University in Changchun, with Dr. Jin as a co-author.

All the men who were analyzed had a Y chromosome that is now mostly found in Eastern Europe, Central Asia and Siberia, but rarely in China. The mitochondrial DNA, which passes down the female line, consisted of a lineage from Siberia and two that are common in Europe. Since both the Y chromosome and the mitochondrial DNA lineages are ancient, Dr. Zhou and his team conclude the European and Siberian populations probably intermarried before entering the Tarim Basin some 4,000 years ago.

The Small River Cemetery was rediscovered in 1934 by the Swedish archaeologist Folke Bergman and then forgotten for 66 years until relocated through GPS navigation by a Chinese expedition. Archaeologists began excavating it from 2003 to 2005. Their reports have been translated and summarized by Victor H. Mair, a professor of Chinese at the University of Pennsylvania and an expert in the prehistory of the Tarim Basin.

As the Chinese archaeologists dug through the five layers of burials, Dr. Mair recounted, they came across almost 200 poles, each 13 feet tall. Many had flat blades, painted black and red, like the oars from some great galley that had foundered beneath the waves of sand.

At the foot of each pole there were indeed boats, laid upside down and covered with cowhide. The bodies inside the boats were still wearing the clothes they had been buried in. They had felt caps with feathers tucked in the brim, uncannily resembling Tyrolean mountain hats. They wore large woolen capes with tassels and leather boots. A Bronze Age salesclerk from Victoria's Secret seems to have supplied the clothes beneath — barely adequate woolen loin cloths for the men, and skirts made of string strands for the women.

Within each boat coffin were grave goods, including beautifully woven grass baskets, skillfully carved masks and bundles of ephedra, an herb that may have been used in rituals or as a medicine.

In the women's coffins, the Chinese archaeologists encountered one or more life-size wooden phalluses laid on the body or by its side. Looking again at the shaping of the 13-foot poles that rise from the prow of each woman's boat, the archaeologists concluded that the poles were in fact gigantic phallic symbols.

The men's boats, on the other hand, all lay beneath the poles with bladelike tops. These were not the oars they had seemed at first sight, the Chinese archaeologists concluded, but rather symbolic vulvas that matched the opposite sex symbols above the women's boats. "The whole of the cemetery was blanketed with blatant sexual symbolism," Dr. Mair wrote. In his view, the "obsession with procreation" reflected the importance the community attached to fertility.

Arthur Wolf, an anthropologist at Stanford University and an expert on fertility in East Asia, said that the poles perhaps mark social status, a common theme of tombs and grave goods. "It seems that what most people want to take with them is their status, if it is anything to brag about," he said.

Dr. Mair said the Chinese archaeologists' interpretation of the poles as phallic symbols was "a believable analysis." The buried people's evident veneration of procreation could mean they were interested in both the pleasure of sex and its utility, given that it is difficult to separate the two. But they seem to have had particular respect for fertility, Dr. Mair said, because several women were buried in double-layered coffins with special grave goods.

Living in harsh surroundings, "infant mortality must have been high, so the need for procreation, particularly in light of their isolated situation, would have been great," Dr. Mair said. Another possible

risk to fertility could have arisen if the population had become in-bred. “Those women who were able to produce and rear children to adulthood would have been particularly revered,” Dr. Mair said.

Several items in the Small River Cemetery burials resemble artifacts or customs familiar in Europe, Dr. Mair noted. Boat burials were common among the Vikings. String skirts and phallic symbols have been found in Bronze Age burials of Northern Europe.

There are no known settlements near the cemetery, so the people probably lived elsewhere and reached the cemetery by boat. No woodworking tools have been found at the site, supporting the idea that the poles were carved off site.

The Tarim Basin was already quite dry when the Small River people entered it 4,000 years ago. They probably lived at the edge of survival until the lakes and rivers on which they depended finally dried up around A.D. 400. Burials with felt hats and woven baskets were common in the region until some 2,000 years ago.

The language spoken by the people of the Small River Cemetery is unknown, but Dr. Mair believes it could have been Tokharian, an ancient member of the Indo-European family of languages. Manuscripts written in Tokharian have been discovered in the Tarim Basin, where the language was spoken from about A.D. 500 to 900. Despite its presence in the east, Tokharian seems more closely related to the “centum” languages of Europe than to the “satem” languages of India and Iran. The division is based on the words for hundred in Latin (centum) and in Sanskrit (satam).

The Small River Cemetery people lived more than 2,000 years before the earliest evidence for Tokharian, but there is “a clear continuity of culture,” Dr. Mair said, in the form of people being buried with felt hats, a tradition that continued until the first few centuries A.D.

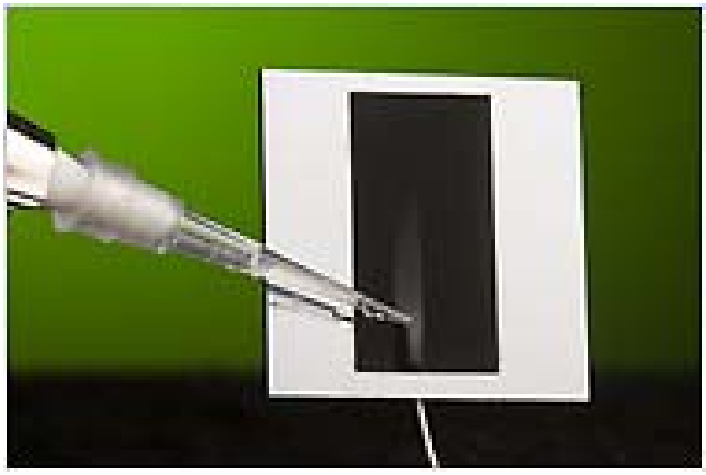
An exhibition of the Tarim Basin mummies opens March 27 at the Bowers Museum in Santa Ana, Calif. — the first time that the mummies will be seen outside Asia.

An earlier version of this article incorrectly described Xinjiang as a province rather than an autonomous region.

http://www.nytimes.com/2010/03/16/science/16archeo.html?ref=science

For Cooler Chips, Follow the Grooves

By HENRY FOUNTAIN



For electronics engineers who want to make faster chips, heat is a big hurdle. More calculations mean more electrons moving through semiconductor material, which generates more heat.

Too much heat makes a chip unstable. So manufacturers use heat sinks or coolers and fans to keep chips at safe operating temperatures. But what if water or other liquid could be circulated on the silicon itself? That might make for better cooling, and faster chips.

That's an eventual goal of research by Chunlei Guo and Anatoliy Vorobyev at the Institute of Optics at the University of Rochester. Using a short-pulse, high-intensity laser, they have created tiny grooves in silicon that exhibit strong capillary action — they quickly wick water along, even against gravity.

The laser technique, described in the journal Optics Express, was originally used on metals, Dr. Guo said. "We realized what we did was dramatically changing the surface properties," he said. "The metal became very hydrophilic." They reasoned that they might be able to do the same with silicon, which is normally hydrophobic — water beads up on it.

The researchers created grooves that were nearly an inch long and 100 microns (about one 250th of an inch) apart. The grooves are not smooth: by carefully controlling the laser, the researchers were able to create nanoscale cavities and protrusions. These improve the wetting properties of the material and raise the possibility of moving lots of water or other coolant along them.

"Liquid goes across the surface so efficiently," Dr. Guo said. "I think it would be an extremely efficient way of taking all the heat away."

The fine structures also have the property of trapping photons, he said, so the grooved silicon appears pitch-black. That might also be useful for making cooler chips, because dark surfaces radiate heat better than lighter ones do.

http://www.nytimes.com/2010/03/16/science/16obcool.html?ref=science

A Supersonic Jump, From 23 Miles in the Air

By JOHN TIERNEY

Ordinarily, Felix Baumgartner would not need a lot of practice in the science of falling.

He has jumped off two of the tallest buildings in the world, as well as the statue of Christ in Rio de Janeiro (a 95-foot leap for which he claimed a low-altitude record for parachuting). He has sky-dived across the English Channel. He once plunged into the black void of a 623-foot-deep cave, which he formerly considered the most difficult jump of his career.

But now Fearless Felix, as his fans call him, has something more difficult on the agenda: jumping from a helium balloon in the stratosphere at least 120,000 feet above Earth. Within about half a minute, he figures, he would be going 690 miles per hour and become the first skydiver to break the speed of sound. After a free fall lasting five and a half minutes, his parachute would open and land him about 23 miles below the balloon.

At least, that's the plan, although no one really knows what the shock wave will do to his body as it exceeds the speed of sound. The jump, expected sometime this year, would break one of the most venerable aerospace records. For half a century, no one has surpassed (one person died trying) the altitude record set by Joe Kittinger as part of an Air Force program called Project Excelsior.

In 1960, Mr. Kittinger, then a 32-year-old Air Force pilot, jumped from a balloon 102,800 feet above the New Mexico desert. Today, at 81, Mr. Kittinger is a retired colonel and part of the Red Bull Stratos team working on Mr. Baumgartner's jump, which is being financed by the energy-drink company.

"For 50 years," Mr. Kittinger said, "I've gotten phone calls from all over the world, people wanting to break my record — one a month, sometimes two a month. But I stayed away from them because they didn't have any idea what the challenge was. What attracted me to Red Bull was their methodological approach to safety and to providing scientific benefits."

More than three dozen veterans of NASA, the Air Force and the aerospace industry have been working for three years to plan the jump, build a balloon and pressurized capsule, and customize an astronaut's suit for Mr. Baumgartner. Besides aiming at records, they're doing physiological research and developing procedures for future astronauts to survive a loss of cabin pressure or an emergency bailout in the stratosphere.

One of the chief concerns has been to avoid the problem that almost killed Mr. Kittinger during Project Excelsior. He was supposed to be stabilized during his fall by a small drogue parachute, but on one training jump in 1959 it did not open because the cord got tangled around his neck.

As a result, Mr. Kittinger's body went into a spin that reached 120 revolutions per minute as he plummeted more than 60,000 feet. He blacked out and regained consciousness only after his reserve parachute opened automatically about a mile above the ground. When he came to, he later wrote, he first assumed he must have died, but then he spotted the parachute's canopy above him and made a sudden realization: "I am impossibly, wonderfully *alive*."

Mr. Baumgartner hopes to remain stable and conscious throughout his longer fall without relying on a drogue parachute. He plans to avoid spinning by adjusting the angle of his body and keeping his arms at his side.

This stabilizing technique would ordinarily be fairly easy for an expert like Mr. Baumgartner, 41, a former paratrooper in the Austrian Special Forces and a veteran of more than 2,500 jumps from planes, cliffs and assorted landmarks. But to survive the stratosphere's near vacuum and frigid temperatures, he will need a sealed helmet and a pressurized suit.

Would he be able to do midair maneuvers in such a bulky contraption? To find out, Mr. Baumgartner and his team recently went to a wind tunnel in Perris, Calif., near Los Angeles, and put the suit through its paces.

Team members suited up Mr. Baumgartner, turned on the oxygen in his helmet and attached a pack to his chest containing equipment to record his vital signs, track his position using GPS satellites and heat his helmet's visor to keep it from fogging.

By the time the suit was inflated to its full pressure of three pounds per square inch, he looked like a robotic version of the Incredible Hulk. As he walked stiffly into the wind tunnel, it was easy to see why astronauts lack a certain grace.

But once Mr. Baumgartner was inside, held aloft by air blowing upward at 130 miles per hour, he looked comfortable enough, much to the relief of the engineers. By adjusting his arms and legs, he could shoot up in the tunnel or bring himself down. Most important, with his body angled at 45 degrees to the ground, he could maintain the desired arrowlike stance: head first, arms and legs pointing backward in a V shape called the delta position.

"It was difficult, but it worked," Mr. Baumgartner said after emerging from the tunnel. "Now I'm confident I can handle the suit in regular free fall as long as we're not breaking the speed of sound. But as soon as it goes from subsonic to transonic to supersonic, we don't know what to expect."

Plenty of planes have broken the sound barrier, but transonic humans are a mystery, said Art Thompson, the technical project director for the Red Bull Stratos mission, and a former Northrop engineer who worked on the B-2 stealth bomber.

"You can run a lot of models, but with the human body you're not dealing with a hard surface or a ballistic shape," Mr. Thompson said. "You've got this rounded bulbous helmet, and the shoulders and the

feet sticking out, and everything starts to happen at different times. Parts of your body may be going supersonic while others aren't, causing flutter waves pulling back and forth among the surfaces."

Could such waves harm the body? Could they create disastrous turbulence?

"We just don't know what will happen to Felix and the suit when he goes supersonic," said another Stratos engineer, Mike Todd, who worked on high-altitude suits for the Air Force's spy-plane pilots with the renowned Skunk Works research division of Lockheed. "Felix could slip right through it, but if half the suit's supersonic and the other half isn't, there could be turbulence that knocks him out of control."

Such risks are one reason why Mr. Kittinger's record has stood for half a century. Air Force and NASA officials have become understandably reluctant to explain potential mishaps to Congressional committees. (To debate the risks and benefits of this project, go to nytimes.com/tierneylab.)

But private adventurers have more freedom to take their own risks. The Stratos medical director, Dr. Jonathan Clark, who formerly oversaw the health of space shuttle crews at NASA, says that the spirit of this project reminds him of stories from the first days of the space age.

"This is really risky stuff, putting someone up there in that extreme environment and breaking the sound barrier," Dr. Clark said. "It's going to be a major technical feat. It's like early NASA, this heady feeling that we don't know what we're up against but we're going to do everything we can to overcome it."

http://www.nytimes.com/2010/03/16/science/16tier.html?ref=science

Answers Begin to Emerge on How Thalidomide Caused Defects

By CARL ZIMMER

The word “phocomelia” means seal limb. It describes an extremely rare condition in which babies are born with limbs that look like flippers.

The long bones of the arms fail to develop, but fingers sometimes sprout from the shoulders. In some cases, the legs fail to develop, too. The French anatomist Étienne Geoffroy Saint-Hilaire coined the word in 1836, and it immediately sank into scientific obscurity for 120 years. And then, 50 years ago, it suddenly became all too familiar.

Doctors began to see more and more cases. It turned out that a drug called thalidomide, which pregnant women were taking for morning sickness, was responsible. Magazines and newspapers ran shocking pictures of seal-limbed children, and the drug was banned in 1962. By then, 10,000 children, mostly in Europe, had been born with thalidomide-induced birth defects.

Despite the notoriety, phocomelia remained scientifically mysterious for the next five decades. Doctors knew all too well to avoid thalidomide, but developmental biologists could not explain how thalidomide made limbs disappear.

Only now are scientists finally starting to solve the puzzle. And by deciphering thalidomide’s effects, they are discovering surprising clues about how normal limbs develop. They hope that those fundamental insights will in turn produce a medical benefit.

Thalidomide may be dangerous to developing embryos, but it is very effective for treating diseases like leprosy and some kinds of cancer. By understanding how thalidomide causes limb deformities, scientists may be able to invent safer variations of the drug.

Neil Vargesson, a developmental biologist at the University of Aberdeen, in Scotland, said that like everyone, he was horrified at children being born with drug-caused defects. “If I can stop that,” he said, “that will be fantastic.”

When thalidomide first went on the market in 1957, in Germany, it was considered so safe that it was sold over the counter. Drug companies introduced it in 45 other countries. But within a few years, doctors in Germany and Australia noticed a rise in phocomelia and eventually linked it to thalidomide. In the United States, about 40 children were born with Thalidomide-induced defects. When its side effects came to light, it had not yet been approved by the Food and Drug Administration.

About 40 percent of babies with thalidomide-induced defects died before their first birthday. Those who survived learned to cope. Survivors who had legs, for example, learned how to use them to dress and feed themselves. “They can do things that ballerinas can only dream of,” said Martin W. Johnson, the director of the Thalidomide Trust, which was established to assist Britain’s thalidomide survivors.

Unfortunately, as the survivors enter their 50s, the strain they have put on their muscles is taking its toll. “Approximately 50 percent of our people are living with chronic pain every day,” Dr. Johnson said in an interview.

Despite the devastation, thalidomide is still in use today. In 1964, Israeli scientists discovered it could control leprosy by reducing the inflammation caused by the disease. In 1998, the F.D.A. approved it for multiple myeloma, a cancer of plasma cells in the blood. Researchers are testing thalidomide in trials for other diseases including H.I.V. and Crohn’s disease. Patients are required to take thalidomide under strict supervision. But in South America and Africa, some women taking it are still giving birth to children with phocomelia.

How thalidomide deforms limbs has continued to baffle scientists. In the 1960s, developmental biologists began to inject thalidomide into animal embryos to trigger phocomelia. From those experiments, they developed about 30 theories. Some scientists argued that thalidomide damaged nerves in developing limbs. Others said that the drug triggered cells in the developing limb to commit suicide. And some said that thalidomide slipped into the DNA of cells in a developing limb, preventing the cells from making the proteins they needed.

Unfortunately, the scientists could not put any of those ideas to rigorous tests. They had only a crude understanding of how limbs developed, because they did not know how to track the molecular changes taking place. And so they had no way of knowing how thalidomide disrupted this chemistry.

Thalidomide itself made the puzzle even harder. When a person ingests a thalidomide pill, enzymes start to break it down into simpler forms, called metabolites. Thalidomide can break down into at least 18 metabolites. Each one has a different structure, and, as a result, it may interact with cells in a different way.

The complexity of thalidomide and the obscurity of limb formation left scientists stymied. “It went very quiet,” said Dr. Vargesson. “But all of a sudden in the past few years, it’s moved forward at a massive rate.”

In 2006, he and a team of collaborators began a survey of the metabolites of thalidomide. William D. Figg of the National Cancer Institute purified them, and Dr. Vargesson and his colleagues tested them in chick embryos. As they described in a report last year, they found that only one metabolite they tested, known as CPS49, caused the chicks to fail to develop wings.

The scientists also noticed something else about CPS49: within minutes of being injected into an embryo, it started killing developing blood vessels. Dr. Vargesson and his colleagues proposed that the death of these new blood vessels stopped the limb bud from taking its final shape.

In a healthy embryo, patches of cells along its sides swell into buds that stretch out into arms and legs. The proliferation of the cells triggers genes in the limb bud, which make proteins that sculpt the limb.

CPS49, Dr. Vargesson argued, starves the limb, causing many cells to die. The surviving cells do not get the proper signals and fail to develop.

This model could account for how thalidomide could have such a drastic effect on limbs without causing much damage elsewhere in the body. Limbs develop relatively late, beginning about 23 days after the start of pregnancy. An embryo exposed to thalidomide at that point would suffer damage to its limbs, Dr. Vargesson said, while the rest of it would suffer less damage because its blood vessels were already mature.

Even if Dr. Vargesson's model turned out to be right, it was missing some key pieces. In order for thalidomide to do its damage, it must grab on to some particular kind of molecule in the embryo.

To find that target, Dr. Hiroshi Handa of the Tokyo Institute of Technology and his colleagues coated microscopic beads with thalidomide. They then immersed the beads in various proteins. As they report in the current issue of Science, a protein known as cereblon latched on tightly to the thalidomide.

"We were very surprised," Dr. Handa said. While scientists have identified scores of genes involved in the development of arms and legs, no one had ever suspected cereblon of playing a role. In fact, no one was sure what cereblon did.

To investigate cereblon further, Dr. Handa and his colleagues ran experiments on zebrafish embryos. The network of genes that builds zebrafish fins is almost identical to the one that builds human limbs. And, just as humans lose limbs, zebrafish lose fins when they are exposed to thalidomide.

The scientists speculated that thalidomide caused the defects by disabling cereblon proteins. They prevented zebrafish embryos from making cereblon, and, just as they predicted, the zebrafish could not grow fins.

If thalidomide could not bind to cereblon, Dr. Handa reasoned, it might lose its power. He and his colleagues tinkered with the gene for cereblon and discovered that if they altered it in two spots, it made a protein that thalidomide could no longer grab. They injected the altered cereblon into the wings of chick embryos along with thalidomide. The chicks grew relatively normal wings despite the thalidomide.

"This is a very important paper," said Rolf Zeller of the University of Basel in Switzerland. "These findings were completely unexpected."

He said that scientists now needed to see if thalidomide was also binding to proteins other than cereblon. "This study identifies a key piece of the 50-year-old puzzle behind the thalidomide tragedy, but it is premature to say 'case closed,' " Dr. Zeller said.

Now scientists have to figure out if thalidomide binding to cereblon is, in fact, the process that shuts down blood vessels. Dr. Handa, meanwhile, is investigating how cereblon controls the development of limbs.

Dr. Vargesson said the new results may point the way to new forms of thalidomide that can fight cancer or other diseases without attacking cereblon, and send phocomelia back to medical obscurity. "That," said Dr. Vargesson, "would be the golden goal."

http://www.nytimes.com/2010/03/16/science/16limb.html?ref=science

The Vast World of the Tiny, Arranged From A to Z

By KATHERINE BOUTON

"The minuscule, a narrow gate, opens up an entire world." This is both Hugh Raffles's epigraph and the last line of his miraculous book "Insectopedia," as inventive and wide ranging and full of astonishing surprises as the vast insect world itself.

In 26 chapters varying from 2 to 42 pages, from "Air" to "Zen" and "The Art of ZZZs," with "Chernobyl," "Fever/Dream," "Kafka," "Sex," "The Sound of Global Warming" and "Ex Libris, Exempla" in between, he takes us on a delirious journey, zooming in and out from the microscopic to the global, from the titillating to the profound, from Niger to China, from one square mile above Louisiana to the recesses of his own mind.

First, that square mile over Louisiana in "Air." In 1926, P. A. Glick, a scientist from the federal Division of Cotton Insect Investigations, and colleagues from the Department of Agriculture, among others, counted about 25 million to 36 million insects, including a ballooning spider they found flying at 15,000 feet, "probably the highest elevation at which any specimen has ever been taken." (A Boeing transatlantic passenger jet flies at an average of 35,000 to 40,000 feet.) We know how the Boeing gets up there, but the spider's launch is an aeronautical feat unequaled by aerospace engineers. Here's how Mr. Raffles describes what Mr. Glick observed: the spiders "not only climb up to an exposed site (a twig or a flower, for instance), stand on tiptoe, raise their abdomen, test the atmosphere, throw out silk filaments, and launch themselves into the blue, all free legs spread eagled, but they also use their bodies and their silk to control their descent and the location of their landing." His own sense of wonder is infectious: "Thirty-six million little animals flying unseen above one square mile of countryside? The heavens opened."

In "Chernobyl," Mr. Raffles profiles Cornelia Hesse-Honegger, an artist obsessed by mutation. Her precise scientific drawings of insects collected in Ticino, Switzerland, affected by the fallout from Chernobyl, countered the claims by scientists that the released radiation was too small to induce mutations. Hers was a long and too familiar battle, but eventually her findings could no longer be denied. "Sharing much of the visual grammar of the biological sciences," Mr. Raffles writes, "the paintings seem mutely dispassionate, resolutely documentary. But so thoroughly in the world, they shimmer with emotion."

"Fever/Dream" is a brief meditation on a time in the Amazon when everyone got malaria. No when, where, who. Just a description of a woman "motionless, lifeless but not quite dead, lifeless on the outside,

but everything happening within, malaria coursing through her veins, bloating her liver, fevering her poor troubled brain."

"Sex." No, this is not about how insects do it (though insect homosexuality is addressed in "Queerness"). Instead it is an essay about Jeff Vilencia, a self-identified "crush freak" and the linchpin of an international brotherhood of 300 likeminded people, who find the idea of being crushed like an insect erotic ("all gentlemen, by the way, very intellectual people," Mr. Vilencia says). His company, Squish Productions, does a mostly mail-order business, but in the early 1990s two of his films ("Squish," about crushing grapes, when he was still finding his métier, and "Smush," featuring earthworms) enjoyed an unexpected art house success.

Mr. Vilencia was invited to a talk show to discuss his work, and soon fell afoul of the morality police, with a Congressman seeing in Squish Productions an inevitable first step leading to kittens and hamsters and on to "Ted Bundy, the Unabomber and the safety of our children." Mr. Vilencia himself is a vegan and an animal rights advocate and has no interest in stomping on anything furry.

Mr. Raffles's flights of prose sometimes tend to excess. At times he seems to be playing with words to see how far he can push them. His chapter "The Deepest of Reveries" starts with a 239-word sentence that both enthralls and calls attention to itself.

A long chapter called "Generosity (the Happy Times)," first printed in Granta, gives us more information on the fighting cricket culture of China than I had tolerance for. But this is an encyclopedia. The format invites you to dip in here and there, skip over the boring parts. But mostly you won't want to. And you will probably never look at a wasp the same way again.

http://www.nytimes.com/2010/03/16/science/16scibks.html?ref=science

For Obese People, Prejudice in Plain Sight

By HARRIET BROWN

As a woman whose height and weight put me in the obese category on the body-mass-index chart, I cringed when Michelle Obama recently spoke of putting her daughters on a diet. While I'm sure the first lady's intentions are good, I'm also sure that her comments about childhood obesity will add yet another layer to the stigma of being overweight in America.

Last August, Dr. Delos M. Cosgrove, a cardiac surgeon and chief executive of the prestigious Cleveland Clinic, told a columnist for The New York Times that if he could get away with it legally, he would refuse to hire anyone who is obese. He probably *could* get away with it, actually, because no federal legislation protects the civil rights of fat workers, and only one state, Michigan, bans discrimination on the basis of weight.

Dr. Cosgrove may be unusually blunt, but he is far from alone. Public attitudes about fat have never been more judgmental; stigmatizing fat people has become not just acceptable but, in some circles, de rigueur. I've sat in meetings with colleagues who wouldn't dream of disparaging anyone's color, sex, economic status or general attractiveness, yet feel free to comment witheringly on a person's weight.

Over the last few years, fat people have become scapegoats for all manner of cultural ills. "There's an atmosphere now where it's O.K. to blame everything on weight," said Dr. Linda Bacon, a nutrition researcher and the author of "Health at Every Size: The Surprising Truth About Your Weight" (Benbella, 2008). "If we're worried about climate change, someone comes out with an article about how heavier people weigh more, so they require more fuel, and they blame the climate change crisis on fatter people. We have this strong belief system that it's their fault, that it's all about gluttony or lack of exercise."

It's no secret that being fat is rarely good for your career. Heather Brown (no relation) has experienced this firsthand. A few years ago, she applied for a grant-writing job with a small nonprofit in the Boston area. After a successful phone interview, she was invited to the office.

"As soon as I shook the interviewer's hand, I knew she would not hire me," Ms. Brown said. "She gave me a look of utter disdain, and made a big deal about whether we should take the stairs or ride the elevator to the room where we were going to talk. During the actual interview, she would not even look at me and kept looking to the side." Ms. Brown, 36, who now works as an assistant dean at a college near Chicago, said she never even got a "No thank you" letter after the interview.

That story is all too familiar to people like Bill Fabrey, an advocate who in 1969 founded the National Association to Advance Fat Acceptance. The organization's archives, he says, are full of stories from people who say they lost jobs or promotions because of their weight, or were not hired in the first place.

Some of the most blatant fat discrimination comes from medical professionals. Rebecca Puhl, a clinical psychologist and director of research at the Rudd Center for Food Policy and Obesity at Yale, has been studying the stigma of obesity for more than a decade. More than half of the 620 primary care doctors questioned for one study described obese patients as "awkward, unattractive, ugly, and unlikely to comply

with treatment." (This last is significant, because doctors who think patients won't follow their instructions treat and prescribe for them differently.)

Dr. Puhl said she was especially disturbed at how openly the doctors expressed their biases. "If I was trying to study gender or racial bias, I couldn't use the assessment tools I'm using, because people wouldn't be truthful," she said. "They'd want to be more politically correct."

Despite the abundance of research showing that most people are unable to make significant long-term changes in their weight, it's clear that doctors tend to view obesity as a matter of personal responsibility. Perhaps they see shame and stigma as a health care strategy.

If so, is it working? Not very well. Many fat people sidestep such judgments by simply avoiding doctor visits, whether for routine checkups, preventive screenings or urgent health problems.

Indeed, Dr. Peter A. Muennig, an assistant professor of health policy at Columbia, says stigma can do more than keep fat people from the doctor: it can actually make them sick. "Stigma and prejudice are intensely stressful," he explained. "Stress puts the body on full alert, which gets the blood pressure up, the sugar up, everything you need to fight or flee the predator."

Over time, such chronic stress can lead to high blood pressure, diabetes and other medical ills, many of them (surprise!) associated with obesity. In studies, Dr. Muennig has found that women who say they feel they are too heavy suffer more mental and physical illness than women who say they feel fine about their size — no matter what they weigh.

Even if doctors don't directly express weight-based judgments, their biases can hurt patients. One recent study shows that the higher a patient's body mass, the less respect doctors express for that patient. And the less respect a doctor has for a patient, says Dr. Mary Huizinga, the study's lead author and an assistant professor at Johns Hopkins School of Medicine, the less time the doctor spends with the patient and the less information he or she offers.

Fat stigma affects everyone's health — fat, thin or in between. Last fall, Lincoln University in southern Pennsylvania announced that it would weigh and measure all freshmen, and require those with a B.M.I. over 30 to enroll in a special fitness class. Fat rights advocates protested it as discrimination: If the fitness class was that important to student health, shouldn't everyone take it?

Lincoln's administrators backpedaled after a storm of bad press. But the controversy underscores the fact that fat stigma isn't about improving people's health, as doctors like Delos Cosgrove contend. If it were, the conversation would be about health rather than numbers on the scale and the B.M.I. chart.

Dr. Bacon tells the story of an overweight teenage girl whose high school was going through a "wellness campaign." Hallways were plastered with posters saying "Prevent teenage obesity." After the posters went up, the girl said, schoolmates began taunting her in the halls, pointing at the obese girl on the posters and saying, "Look at the fat chick."

She said heavier students were now made to feel guilty about their lunch choices, but the thin ones could eat anything they wanted without comment — even if it was exactly what the fat kids were eating. "Stigmatization gives the thinner kids permission to think there's something wrong with the larger kids," Dr. Bacon, the nutrition researcher, said. "And it doesn't help them look at their own health habits. There's got to be a way to do this more respectfully and more effectively."

Harriet Brown teaches magazine journalism at the Newhouse School in Syracuse.

http://www.nytimes.com/2010/03/16/health/16essa.html?ref=science

Toxic troubles for climate 'fix'

By Richard Black
Environment correspondent, BBC News

Fertilising the oceans with iron to absorb carbon dioxide could increase concentrations of a chemical that can kill marine mammals, a study has found.

Iron stimulates growth of marine algae that absorb CO2 from the air, and has been touted as a "climate fix".

Now researchers have shown that the algae increase production of a nerve poison that can kill mammals and birds.

Writing in Proceedings of the National Academy of Sciences, they say this raises "serious concern" over the idea. The toxin - domoic acid - first came to notice in the late 1980s as the cause of amnesiac shellfish poisoning.

" **If the end goal is to use it to fight climate warming, then we have to understand the consequences for marine life** "
Dr William Cochlan San Francisco State University

It is produced by algae of the genus *Pseudonitzschia* , with concentrations rising rapidly when the algae "bloom". Now, its presence in seawater often requires the suspension of shellfishing operations, and is regularly implicated in deaths of animals such as sealions.

Domoic acid poisoning may also lie behind a 1961 incident in which flocks of seabirds appeared to attack the Californian town of Capitola - an event believed to have shaped Alfred Hitchcock's interpretation of Daphne du Maurier's The Birds in his 1963 thriller.

Carbon focus

Over the last decade, about 10 research projects have investigated iron fertilisation, with mixed results.

But only two of them measured domoic acid production, and only then as an afterthought, explained William Cochlan from San Francisco State University, a scientist on the new project.

"We had a number of major aims in this work; but one of them was to ask 'do you normally find the species of algae that produce domoic acid, are they producing domoic acid, and will production be enhanced by iron?'," he said. In studies conducted around Ocean Station Papa, a research platform moored in the north-eastern Pacific Ocean, the answers to all three questions turned out to be "yes".

Pseudonitzschia algae were present naturally; they were producing domoic acid, and experiments showed that production increased during fertilisation with iron and copper. Also, under iron-rich conditions, the *Pseudonitzschia* algae bloomed at a rate faster than other types.

The levels of domoic acid in iron-enriched water samples were of the same order as those known to cause poisoning in mammals in coastal waters.

Ailsa Hall, deputy director of the Sea Mammal Research Institute at St Andrews University in Scotland, said that domoic acid poisoning was already becoming a regular occurrence in some parts of the world.

"Ever since 1998 we've seen regular episodes of mass mortality and seizures in sea lions on the US west coast," she said.

The toxin accumulates in animals such as fish that are themselves immune.

"We've seen it in seals, pelicans and harbour porpoises; it does depend on how much they eat, but if a sea lion or a pelican eats its way through a school of contaminated anchovies, then that would be enough," Dr Hall told BBC News.

Domoic acid's effect on other species was unknown, she said, but it would be reasonable to think it would also affect marine mammals such as whales.

Whether iron fertilisation ever will be deployed as a "climate fix" is unclear. The last major investigation - last year's Lohafex expedition - found that despite depositing six tonnes of iron in the Southern Ocean, little extra CO2 was drawn from the atmosphere.

Nevertheless, one company - Climos - aims eventually to deploy the technique on a commercial basis.

A Climos spokesman agreed that further research on domoic acid production was needed. "Moving forward, we need to understand exactly how deep-ocean phytoplankton respond to iron, be it naturally or artificially supplied; whether and in what situations domoic acid is produced, and how the ecosystem is or is not already adapted to this," he said.

For William Cochlan's team, the potential impact on sea life is something that regulators and scientists must take into account when deciding whether to allow further studies or deployment. "We saw some literature going around with claims like 'there is no indication of toxicity to sea life' - well, if you don't measure it, of course there's no indication, and we have to keep that kind of legalese out of science," he said.

"If the end goal is to use it to fight climate warming, then we have to understand the consequences for marine life."

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Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8569351.stm

Published: 2010/03/16 03:04:58 GMT

Home improvement 'hitting swifts'

A UK-wide survey of nesting swifts has suggested the declining bird species is at risk from improvement work being undertaken on old houses.

The RSPB study of more than 3,400 swift nest sites found nearly 80% were on houses, more than half of which were homes built before 1919.

It is not known why the birds are in decline, but numbers have fallen by almost a third in the past decade.

The charity says building work should not be done while swifts are nesting.

The birds tend to return to the same nesting sites each year and the RSPB said it was concerned the birds were suffering as a result of demolition and improvement works.

More than half the sites located in the survey had been known nesting places for swifts for more than 10 years, and about one in six spots was under threat, the RSPB said.

" **The scream of the swift marks the start of summer for many people. To think that we are losing them at such a fast rate is devastating** "
Sarah Niemann, RSPB

Emma Teuten, the RSPB's data management officer, said: "These are birds that don't touch down for two years or more after they first leave the nest - we need to make sure they have a safe, secure nest site to settle in when they come down to breed themselves."

Sarah Niemann, RSPB species recovery officer, said: "The scream of the swift marks the start of summer for many people. To think that we are losing them at such a fast rate is devastating.

"It was imperative that we find out exactly where they nest, so that efforts to help them can be effectively targeted."

Swifts make their nests in holes in buildings from where they can launch themselves back onto the wing as they cannot take off from the ground. Their nests are protected by law while they are in use, so work on homes with nesting swifts should be done before they arrive in mid-May or after they leave in mid-August, the RSPB said.

The charity is appealing to the public for help spotting nests and talking to local councils and developers about how to retain and replace nest sites.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8569267.stm

Published: 2010/03/16 01:53:50 GMT

Impotence 'link to heart death'

Impotence is a strong predictor of heart attack and death among high-risk patients, German researchers have said.

The study of 1,519 men who already had cardiovascular disease found those who were also impotent had twice the risk of a heart attack or death as the rest.

The University of Saarland report, published in the journal Circulation, suggests men with impotence should be checked for cardiovascular disease.

Some experts want doctors to ask about impotence in over-40s health checks.

Impotence is linked to inadequate blood flow in the penile arteries.

These are much smaller than coronary arteries.

So for some men, a persistent failure to get an erection might be an early sign that his arteries are narrowing.

" **A whole segment of men is being placed at risk** "
Michael Böhm, lead author

The study followed men from 13 countries who already had cardiovascular disease. It monitored whether they went on to have heart attacks or strokes.

The participants were also asked about their erectile dysfunction at the start, after two years and after five years.

Powerful predictor

As well as being twice as likely to die or have a heart attack, those with impotence were also 10% more likely to have a stroke and 20% more likely to be hospitalised for heart failure, after adjusting for factors like age and smoking.

Lead author Michael Böhm said men who take medication to treat impotence should also be checked for cardiovascular disease, but this does not always happen.

"The medication works and the patient doesn't show up anymore," Mr Böhm said.

"These men are being treated for the erectile dysfunction, but not the underlying cardiovascular disease. A whole segment of men is being placed at risk."

The study confirms previous research that has linked impotence and cardiovascular disease. It has been welcomed by British experts.

Unrecognised

Richard Hobbs, professor of general practice at the University of Birmingham, said doctors were already aware of the link, but said the findings of this study added weight to the case for screening of men with impotence for the co-existence of vascular disease.

" **A GP might be thought negligent not to ask about smoking, yet they routinely fail to ask about impotence** "
Dr Geoff Hackett, consultant urologist

Professor Mike Kirby, a doctor who specialises in erectile dysfunction and cardiovascular risk, thinks doctors should be more pro-active still.

As well as checking impotent patients for cardiovascular risks, he wants doctors to start screening for impotence.

"This provides very good evidence to support a campaign to persuade doctors to ask about erectile dysfunction as part of routine cardiovascular assessment," said Professor Kirby.

He said men who were impotent often did not raise it with their doctors because they were embarrassed and were not aware of the wider health implications.

'**National disgrace**'

Dr Geoff Hackett, a consultant urologist at the Good Hope Hospital in Sutton Coldfield, said it was a "national disgrace" that medicals for over-40s did not include questions about impotence.

He said that when GPs were trying to assess whether a patient is at risk of heart disease, they asked about smoking and family history. But impotence is a more significant risk factor for cardiovascular disease than smoking.

"A GP might be thought negligent not to ask about smoking, yet they routinely fail to ask about impotence." he said.

A Department of Health spokesperson said: "Some reports do suggest a link between erectile dysfunction and heart disease, and the Department of Health will keep new and emerging evidence under review in relation to the content of the NHS Health Check programme."

The NHS Health Check programme offers five-yearly medicals to 40 to 74-year-olds with the aim of preventing heart disease, stroke, diabetes and chronic kidney disease.

They started being rolled out in 2009.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8564181.stm

Published: 2010/03/16 00:00:30 GMT

No quick fix for diabetes risk

Two key treatments do not halt diabetes in people with early signs of the disease, a large study has found.

Researchers said the results showed the only way to ensure future health in people at high risk of diabetes was exercise and a healthy diet.

Trials in more than 9,000 people also found no reduction in future heart problems in people prescribed two drug treatments compared with dummy pills.

Diabetes UK said 7m people in the UK were at risk of developing diabetes.

" **The most successful treatment for someone at high risk of diabetes is diet and exercise** "
Professor Rury Holman, study author

Everyone taking part in the study, published in the New England Journal of Medicine, had been diagnosed with what doctors call "impaired glucose tolerance".

It effectively means that people have high blood sugar and their bodies are starting to not respond to insulin as well as they should.

Sometimes called pre-diabetes, it is thought that the condition is a stage in the development of full-blown type 2 diabetes, and can be associated with obesity.

It is thought that in the UK, around 17% of 35-65 year olds have impaired glucose tolerance.

Medical intervention

In the trial, researchers in the US and UK looked at whether using a drug that lowers blood pressure or a drug which lowers blood sugar could be used to stop diabetes developing in these high-risk patients.

But the results, from patients in 40 countries, found no great difference in how many people went on to get diabetes when prescribed either drug compared with a dummy pill.

Neither did the drugs prevent future heart attacks and strokes, which are dangerous complications of the condition.

In the blood-sugar lowering drug part of the study around a third of people went on to develop diabetes within five years whether they were taking the real medicine or dummy medicine.

Professor Rury Holman, director of the Diabetes Trials Unit at the University of Oxford, said the treatments were proven to be effective once someone had diabetes but there was an "urgent need" for drugs to prevent the disease and its complications developing in the first place in those at high risk.

He said: "The most successful treatment for someone at high risk of diabetes is diet and exercise."

'**Dramatic difference**'

Co-author Professor John McMurray from the University of Glasgow agreed that the results reinforced the importance of lifestyle changes in preventing diabetes.

"Losing as little as 5% of body weight has been shown to make a dramatic difference in other studies."

Dr Victoria King, research manager at Diabetes UK, said: "Unfortunately there is unlikely to be a quick and easy route to prevent type 2 diabetes and a healthy balanced lifestyle with a good diet and physical activity levels are the best preventative methods."

But she added some drugs may be of benefit in these patients and the latest study would help doctors prescribe the most appropriate option.

Professor Alan Maryon-Davis, president, UK Faculty of Public Health, said: "A huge number of people are in this 'nearly diabetes' category without realising it.

"We need to rapidly expand the national healthcheck programme, with many more community dietitians and exercise advisors ready to offer help."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8564197.stm

Published: 2010/03/15 00:01:05 GMT

To catch a thief, follow his filthy hands

Unique bacterial profiles give criminals another reason to wear gloves
By Tina Hesman Saey
Web edition : Monday, March 15th, 2010

Bacteria may one day help crime scene investigators catch criminals dirty-handed.

Having found previously that everyone's hands carry a unique bacterial population, researchers at the University of Colorado in Boulder have now shown that the mix of microbes left on a computer keyboard can be used to tell if a particular person had used it.

Their tests, reported online the week of March 15 in the *Proceedings of the National Academy of Sciences*, raise the possibility that hand bacteria could potentially serve as a new type of fingerprint. Noah Fierer and his colleagues wondered if bacteria could be used in forensic tests when fingerprints fail, such as when the prints are smudged or evidence consists of fabric or other soft surfaces that don't lend themselves to fingerprinting.

After all, says Fierer, "you only need to smudge a fingerprint, but you can't sterilize a surface just by wiping it off."

Fierer and his colleagues swabbed the hands of three people and took samples of bacteria from keyboards used exclusively by each of the three. The researchers then created DNA profiles of bacterial populations from the hands and keyboards. The bacteria on an individual's keyboard closely matched bacteria on their hands, the team found. And the bacterial DNA remained useful for at least two weeks after swabbing.

In order for bacterial fingerprints to be useful, however, they must distinguish a person from the general population. So the researchers took swabs from nine computer mice and the mouse owners' palms. The team then compared the bacterial DNA signatures of the mice and palms to a database of bacteria on 270 hands from other people, typically including both of a person's hands, sampled for the Human Skin Microbiome project to survey the diversity of microbes living on human skin. In all nine cases, the bacteria on a computer mouse were more similar to bacteria from the owner's palm than to those from any other hand in the database, the team found.

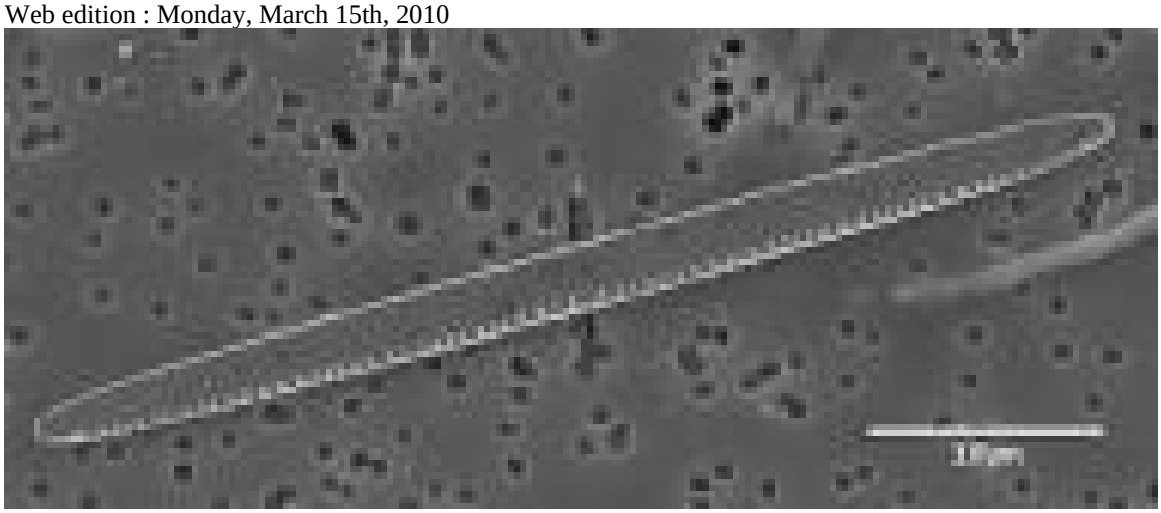
Other researchers wonder if the technique will be successful in the real world. "Right now we really have no idea how unique a person's skin microbiome is," says Elizabeth Grice, a geneticist at the National Human Genome Research Institute and one of the leaders of the skin microbiome project. In the new study, the researchers sampled objects handled by only one person, but if two or more people touch an object they may leave behind a mix of bacteria that might resemble a third person, she speculates.

Fierer agrees that much more testing is needed to determine whether bacterial fingerprinting will be a useful forensic tool. The researchers are now trying to determine how many times people must touch objects to leave their bacterial signatures behind and whether bacterial fingerprints can be lifted from cloth or other soft surfaces.

http://www.sciencenews.org/view/generic/id/57324/title/To_catch_a_thief%2C_follow_his_filthy_hands

Iron fertilization in ocean nourishes toxic algae

Carbon sequestration efforts could trigger harmful algal blooms
By Sid Perkins
Web edition : Monday, March 15th, 2010



Micro mug shotThe exoskeleton of a toxin-producing diatom *Pseudonitzschia turgidula*. The phytoplankton species proliferates when fed dissolved iron, a finding that reveals a potential downside of attempts to sequester carbon by fertilizing the ocean.Brian Bill, NOAA/SFSU

A plan to combat global warming by fertilizing the ocean may backfire by triggering toxic algal blooms, a new study suggests.

Scientists have known for decades that dumping iron in the ocean, especially in areas where that nutrient is in short supply, stimulates the growth of algae and other phytoplankton. These tiny organisms pull carbon dioxide from the atmosphere as they grow, prompting research on the potential of iron fertilization to pull the greenhouse gas from the atmosphere and scuttle it in the deep sea as sunken algae.

But some researchers, besides wondering about the long-term effectiveness of such efforts, have questioned whether such schemes might have unintended side effects, says Charles Trick, a biological oceanographer at the University of Western Ontario in London, Canada. Now, Trick and his colleagues report online the week of March 15 in *Proceedings of the National Academy of Sciences* that fertilizing the ocean with iron can stimulate algae that make a neurotoxin called domoic acid.

The amounts of domoic acid produced don't rise to levels known to be toxic to krill and other species that feed on *Pseudonitzschia*, Trick notes. And the areas where iron fertilization would typically take place are relatively barren zones far from fisheries. Nevertheless, he notes, the effects of long-term exposure to low levels of the neurotoxin are unknown.

The new study is "less a prediction of ecological doom than it is a lesson about not knowing the consequences of our actions," Trick adds.

In nearshore areas where nutrients are plentiful, algae of the genus *Pseudonitzschia* — diatoms that release domoic acid as they proliferate — sometimes undergo harmful blooms, Trick says. But open-ocean species of *Pseudonitzschia* have previously been considered nontoxic.

Sensitive chemical analyses in the new study reveal that open-ocean species of *Pseudonitzschia* may not be totally harmless. Two species of the diatom produced domoic acid in shipboard experiments.

In 2006, the researchers collected water samples at a site in the Gulf of Alaska where scientists had in previous years conducted iron fertilization experiments. In this nutrient-poor swath of the ocean, unsurprisingly, algae and other plankton were sparse, Trick says. Two species of *Pseudonitzschia* accounted for only a few percent of the plankton in the water samples and showed up at concentrations of less than 1,000 cells per liter.

But adding dissolved iron to those water samples fueled explosive growth among the *Pseudonitzschia*. Populations doubled in about nine days, and at the end of the experiments the genus made up as much as 80 percent of the plankton in some water samples.

Results of the experiments bolster the notion that *Pseudonitzschia* release domoic acid not to poison other creatures but to aid their own uptake of iron. Experiments suggest the neurotoxin binds with iron and then is reabsorbed only by *Pseudonitzschia*, a technique that helps these diatoms outcompete other plankton for the metal.

Domoic acid production by open-ocean species of *Pseudonitzschia* "had been anticipated but has not been previously published," says Kenneth Coale, a biogeochemist at Moss Landing (Calif.) Marine Laboratories. He and his colleagues have also seen increased domoic acid production in their iron fertilization experiments, Coale says. The new findings point out potential consequences should anyone consider the technique as a serious option for carbon sequestration, he adds.

http://www.sciencenews.org/view/generic/id/57318/title/Iron_fertilization_in_ocean_nourishes_toxic_algae

Soothing start to childhood weight problems

Pacifying infants with food may raise likelihood of later obesity
By Bruce Bower
Web edition : Monday, March 15th, 2010
BALTIMORE — Parents who use food to sooth anger- and tantrum-prone infants may raise the likelihood of those youngsters becoming overweight or obese, according to preliminary evidence presented March 13 by psychologist Cynthia Stifter of Pennsylvania State University in University Park.

"This type of parental behavior may promote an association between food and comfort in kids who are temperamentally disposed to anger," Stifter said at the International Conference on Infant Studies. It's already known that equating food with comfort is linked to adult obesity.

Stifter directed a survey of 100 mothers of youngsters between 3 months and 3 years old. About half the mothers were overweight or obese.

Mothers who described their children as inclined to getting upset and throwing tantrums also reported having frequently used food to sooth them, especially as a last resort in public places. Temperamentally difficult youngsters weighed increasingly more, relative to height, the more their mothers used food to calm and control them.

Stifter's team also found that the heaviest children tended to have overweight mothers who rated themselves as poor parents. Long-term studies need to examine whether an early association of food with comfort influences the development of some cases of child and adult obesity, Stifter said.

http://www.sciencenews.org/view/generic/id/57313/title/Soothing_start_to_childhood_weight_problems

Babies see human hand behind ordered events

Experiments find that infants attribute actions to people
By Bruce Bower
Web edition : Monday, March 15th, 2010
BALTIMORE — Just like adults, babies regard recurring patterns or events as the products of intentional human actions, researchers reported March 12 at the International Conference on Infant Studies.

This early tendency to assume that any order one sees must have been created on purpose gets amplified with age, said psychologist Lili Ma of the University of British Columbia in Vancouver, Canada. “Adults in many cultures infer rational agents, such as gods, from regularities that they see in nature.”

In a series of experiments, 9- to 10-month-olds first saw that either a mechanical claw or an adult’s hand could pick up yellow and red pingpong balls and drop them into a clear container. Then infants watched nine balls roll down a chute, one at time, into a transparent tube without knowing whether a person or the claw had inserted them.

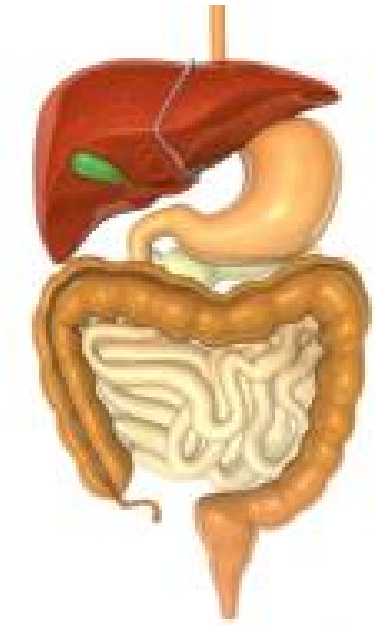
Over 12 trials, balls sometimes rolled by in a regular pattern — say, three yellow, three red, three yellow, or two yellow, one red repeated three times — and at other times formed a random pattern. After each set of balls entered the tube, researchers removed a barrier to show either a claw or a hand poised above a container connected to the chute.

Babies looked much longer at a claw than at a hand after seeing regular patterns, the equivalent of a surprised double take at a violation of what they expected to see, Ma proposed. Infants gazed slightly longer at a hand than at a claw after seeing random patterns, but not long enough to suggest that they had any strong expectations about causes of random patterns

http://www.sciencenews.org/view/generic/id/57311/title/Babies_see_human_hand__behind_ordered_events

What the appendix is good for

Some body parts seem pointless but in fact have purpose
By Emily Sohn
Web edition : Monday, March 15th, 2010



The digestive systemThe appendix is a small organ that looks like a little worm (lower left of image). It doesn't lead anywhere, but may serve as a haven for good bacteria.3drenderings/iStockphoto

It was a Saturday morning in 1991 when 12-year old Heather Smith woke up feeling nauseous. Spring break was just beginning, and her parents were planning to take her skiing the next day in Flagstaff, Ariz. — two hours from their home in Tempe.

A stomachache was not how Smith wanted to start vacation. “I was hoping I would get better,” she says, “So I could go ski.”

As the day progressed, things worsened. A sharp pain developed in her lower right side. She couldn’t swallow the soup her sister warmed up for her at lunchtime. By the time she saw a doctor later that afternoon, she was hunched over in pain.

When she learned that her appendix was infected, she didn’t have much time to be afraid. She was rushed into surgery. The next morning, her appendix was gone.

“It was a little scary because it happened so quickly,” says Smith, now an evolutionary biologist at the Arizona College of Osteopathic Medicine at Midwestern University in Glendale, Ariz. But she has never missed her long-lost organ. In fact, the emergency left her with a lifelong fascination for a body part she no longer has.

“I have always been interested in the appendix and trying to figure out why we have one,” Smith says. “There’s been this idea for so long that it didn’t do anything.”

Appendices have long been considered “vestigial structures.” That means we don’t actually need them. The brain, heart, skin and most other organs are essential for survival. But you can live a long life without an appendix. The same goes for tonsils, wisdom teeth, body hair and other vestigial structures.

At best, according to traditional thinking, vestigial structures just take up space. At worst, they can get infected and cause all sorts of trouble. So why do we have these unnecessary body parts in the first place?

Growing evidence suggests that we have them because they aren't actually unnecessary at all. Their function probably depends on where you live (and perhaps when you lived). In some parts of the world, people still need vestigial body parts. Studying where and when these features are or were useful is helping scientists make new advances in modern medicine. The work is also providing insight into the history of humankind — telling scientists things about our ancestors that we didn't know before.

"It may be the case with a lot of unnecessary body parts that they may have had a function in the past but we don't necessarily need that function anymore," says Smith, who ended up studying the appendix sort of by accident. "That can give us insights."

The hidden point

Consider your body, and you'll notice a hodgepodge of random features that might seem silly when you stop to think about them. What's the point of fingernails, for example? Why is there hair on your toes? And what's the deal with muscles in your ears? Do we really need muscles in our ears?

Wisdom teethOur ancestors may have found wisdom teeth more useful than we do.Lakhesis/iStockphoto

Throughout history, scientists, too, have wondered about structures that don't seem to do anything useful. The appendix is a popular example. This little, worm-like pouch is about four inches long and less than half an inch wide.

The organ grows near where the long intestine meets the short intestine. The intestines are essential for digestion, but the appendix appears to just sit there.

"It's a dead-end sack," says William Parker, an immunologist at Duke University in Durham, N.C. "It doesn't go anywhere."

Parker didn't start out intending to study the appendix. His specialty is the immune system — a collection of organs, cells and molecules that our bodies use to stay healthy. But his research led him to the appendix anyway.

Parker knew that the human body is full of tiny organisms called bacteria, which can overwhelm the immune system, cause infections and make a person sick. He also knew that some bacteria are good for human health. Among other benefits, these "good" bacteria help people digest food and fight off "bad" bacteria that cause disease.

The immune system doesn't just benefit from good bacteria, though. In the 1990s, Parker and colleagues began to figure out that the immune system also helps good bacteria flourish. These bacteria appear in thin layers called biofilms, which grow on the side of the gut near and inside the appendix. These biofilms, the researchers learned, provide a barrier that keep out bad bacteria.

"Once we figured that out, it should have been obvious to us what the appendix did," says Parker, whose team also found that the appendix has a particularly robust biofilm. "It's in the perfect spot to harbor bacteria — out of the flow and with a thin, narrow opening. And there's a large amount of immune tissue associated with it."

After stumbling on a possible link between the immune system and the appendix, though, the scientists still had some clues to compile before being sure of the organ's purpose.

Hangout for good bacteria

In 2007, Parker's team put together all the evidence they had gathered and came up with a conclusion: The appendix serves as a "safe house," Parker says, a storage bin for good bacteria. If bad bacteria attack, good bacteria emerge from the appendix and come to the rescue.

Having a safe space for good bacteria should be especially useful in parts of the world that are poor and undeveloped — places where people are starving, medicine is hard to come by, clean water is scarce and diarrhea can kill. In those places, Parker says, the appendix probably helps keep people alive, especially young children.

In fact, people in the developing world rarely get infected appendixes, like Smith's. Most cases of appendicitis, in fact, occur in the United States and other developed countries, where water is purified, hospitals are sterilized and medical care is easier to get.

Those trends suggest that the appendix evolved in our ancestors to maintain health in a bacteria-filled world. Today, places such as the United States might be too sterile for the appendix. When the organ has nothing do, the immune system can turn on itself, sending people to the emergency room, Parker says. Other problems, such as allergies and immune diseases, might have similar roots.

Even in ultra-clean societies, then, the appendix and other vestigial organs might be unrecognized heroes.

"Just because body parts don't seem to have any usefulness here doesn't mean you wouldn't need them if you were suddenly thrown in the middle of the woods somewhere and had to drink from whatever mud hole you could find nearby and you had to run away from predators," Parker says. "Problems we are having today with allergies and autoimmune diseases are a result of the body not really fitting in with our culture."

Figuring out the true purpose of the appendix and other overlooked organs, Parker adds, is an important step toward solving medical mysteries.

"We want to understand how the body functions so we can work towards getting it to function normally," he says.

To do that, it can help to take an historical view. By considering what was normal a long time ago and comparing the old normal to the new normal, researchers can see how evolution has shaped our bodies over hundreds of thousands of years. That process of change over time is called evolution.

"The best way to figure out how the body was designed to work," Parker says, "is to look at how it was meant to work over hundreds of millions of years of evolution."

Wise beyond our years

The appendix isn't the only example of a body part with hidden powers. Wisdom teeth are another. This final set of molars usually grows in at around age 20. Today, most people get their wisdom teeth removed before the bulky molars can squeeze other teeth out of place or get infected.

Millions of years ago, though, human faces weren't as flat as they are today and mouths had more room for wisdom teeth. After 20 years of life without dental care, our ancestors would have benefited from a fresh set of strong teeth that could chew and grind raw food.

As for other structures long thought to be pointless, a recent study found that the spleen stores a whole lot of immune cells. Among other roles, those cells help to repair hearts that are damaged. Tonsils, which are

also removed routinely in many developed countries, probably help boost the immune system, as well, Parker says.

As they continue to find purposes for seemingly purposeless body parts, scientists are connecting our present with the past. They are also connecting the human animal with other animals on Earth.

Last year, Smith teamed up with Parker and other colleagues to look at a whole bunch of mammal species, some that lived tens of millions of years ago. The researchers found that the appendix has existed in a wide range of animals, from rodents to primates to Australian marsupials. The study also revealed that the appendix evolved more than once throughout history. Both findings suggest that the appendix has had an important purpose throughout time.

By looking closely at our body's "pointless" parts, we can begin to imagine what our bodies used to be able to do. Recognizing the body's lingering power could also open up a whole new future of possibilities.

"Our evolution gives our bodies a lot of resilience and strength we really don't need very much in our society," says Parker. "I sit around in my office and have all the food I want. My body can do so many things I never ask it to do."

http://www.sciencenews.org/view/generic/id/57296/title/FOR_KIDS_What_the_appendix_is_good_for1

One Gene Lost = One Limb Regained? Scientists Demonstrate Mammalian Regeneration Through a Single Gene Deletion

Lab mouse. (Credit: iStockphoto)

ScienceDaily (Mar. 16, 2010) — A quest that began over a decade ago with a chance observation has reached a milestone: the identification of a gene that may regulate regeneration in mammals. The absence of this single gene, called p21, confers a healing potential in mice long thought to have been lost through evolution and reserved for creatures like flatworms, sponges, and some species of salamander.

In a report published in the *Proceedings of the National Academy of Sciences*, researchers from The Wistar Institute demonstrate that mice that lack the p21 gene gain the ability to regenerate lost or damaged tissue.

Unlike typical mammals, which heal wounds by forming a scar, these mice begin by forming a blastema, a structure associated with rapid cell growth and de-differentiation as seen in amphibians. According to the Wistar researchers, the loss of p21 causes the cells of these mice to behave more like embryonic stem cells than adult mammalian cells, and their findings provide solid evidence to link tissue regeneration to the control of cell division.

"Much like a newt that has lost a limb, these mice will replace missing or damaged tissue with healthy tissue that lacks any sign of scarring," said the project's lead scientist Ellen Heber-Katz, Ph.D., a professor in Wistar's Molecular and Cellular Oncogenesis program. "While we are just beginning to understand the repercussions of these findings, perhaps, one day we'll be able to accelerate healing in humans by temporarily inactivating the p21 gene."

Heber-Katz and her colleagues used a p21 knockout mouse to help solve a mystery first encountered in 1996 regarding another mouse strain in her laboratory. MRL mice, which were being tested in an autoimmunity experiment, had holes pierced in their ears to create a commonly used life-long identification marker. A few weeks later, investigators discovered that the earholes had closed without a trace. While the experiment was ruined, it left the researchers with a new question: Was the MRL mouse a window into mammalian regeneration?

The discovery set the Heber-Katz laboratory off on two parallel paths. Working with geneticists Elizabeth Blankenhorn, Ph.D., at Drexel University, and James Cheverud, Ph.D., at Washington University, the laboratory focused on mapping the critical genes that turn MRL mice into healers. Meanwhile, cellular studies ongoing at Wistar revealed that MRL cells behaved very differently than cells from "non-healer" mouse strains in culture. Khamilia Bedebaeva, M.D., Ph.D., having studied genetic effects following the Chernobyl reactor radiation accident, noticed immediately that these cells were atypical, showing profound differences in cell cycle characteristics and DNA damage. This led Andrew Snyder, Ph.D., to explore the DNA damage pathway and its effects on cell cycle control.

Snyder found that p21, a cell cycle regulator, was consistently inactive in cells from the MRL mouse ear. P21 expression is tightly controlled by the tumor suppressor p53, another regulator of cell division and a known factor in many forms of cancer. The ultimate experiment was to show that a mouse lacking p21 would demonstrate a regenerative response similar to that seen in the MRL mouse. And this indeed was the case. As it turned out, p21 knockout mice had already been created, were readily available, and widely used in many studies. What had not been noted was that these mice could heal their ears.

"In normal cells, p21 acts like a brake to block cell cycle progression in the event of DNA damage, preventing the cells from dividing and potentially becoming cancerous," Heber-Katz said. "In these mice without p21, we do see the expected increase in DNA damage, but surprisingly no increase in cancer has been reported."

In fact, the researchers saw an increase in apoptosis in MRL mice -- also known as programmed cell death -- the cell's self-destruct mechanism that is often switched on when DNA has been damaged. According to Heber-Katz, this is exactly the sort of behavior seen in naturally regenerative creatures.

"The combined effects of an increase in highly regenerative cells and apoptosis may allow the cells of these organisms to divide rapidly without going out of control and becoming cancerous," Heber-Katz said. "In fact, it is similar to what is seen in mammalian embryos, where p21 also happens to be inactive after DNA damage. The down regulation of p21 promotes the induced pluripotent state in mammalian cells, highlighting a correlation between stem cells, tissue regeneration, and the cell cycle."

The study was supported by grants from the Harold G. and Leila Y. Mathers Foundation, the F.M. Kirby Foundation, the W.W. Smith Foundation, the National Institute for General Medical Sciences and National Cancer Institute.

Study investigators also include Wistar researchers Paul M. Lieberman, Ph.D.; Dmitri Gourevitch M.D.; Lise Clark D.V.M., Ph.D.; Xiang-Ming Zhang; and John Leferovich. Snyder, formerly of the Lieberman laboratory at Wistar, and Bedebaeva are co-first authors on this paper. James Cheverud of Washington University is also a co-author on this paper.

Story Source:

Adapted from materials provided by The Wistar Institute.

Journal Reference:

1. Khamilia Bedelbaeva, Andrew Snyder, Dmitri Gourevitch, Lise Clark, Xiang-Ming Zhang, John Leferovich, James M. Cheverud, Paul Lieberman, and Ellen Heber-Katz. **Lack of p21 expression links cell cycle control and appendage regeneration in mice**. *Proceedings of the National Academy of Sciences*, 2010; DOI: 10.1073/pnas.1000830107

http://www.sciencedaily.com/releases/2010/03/100315161913.htm

Bt Protein Found Effective Against Parasitic Roundworm Infections

The researchers found that a protein from a soil bacterium is three times better at killing this intestinal parasitic roundworm in mice than the current best available treatment. At top right, the male parasite. At bottom, the female parasite. (Credit: Aroian Laboratory, UCSD)

ScienceDaily (Mar. 16, 2010) — Biologists at UC San Diego have discovered that a protein from a soil bacterium used to kill insects naturally on organic crops is a highly effective treatment for intestinal parasitic roundworms. These parasites, which include hookworms and whipworms, infect about two billion people in underdeveloped tropical regions and are cumulatively one of the leading causes of debilitation worldwide.

The scientists report in the March 2 issue of the open-access journal *PLoS Neglected Tropical Diseases*, that a crystal protein known as Cry5B produced by the Bt, or *Bacillus thuringiensis*, bacterium is highly effective at a single dose at curing mammals of intestinal roundworm infections.

Bt is a bacterium famous for its use in agricultural insect control and is the leading biologically produced insecticide worldwide. Bt crystal proteins have been used as insecticides for over five decades and are known to be non-toxic to vertebrates.

The discovery of the crystal protein's effectiveness against parasites was made in a UCSD laboratory that has conducted pioneering studies of Bt crystal proteins such as Cry5B that kill roundworms, instead of insects.

Parasitic roundworms, are considered by public-health officials to have a combined debilitating impact on human populations that is comparable to, or in some estimates greater than, that of malaria or tuberculosis.

"More than two billion people are infected with these parasites worldwide," said Raffi Aroian, a professor of biology at UCSD who headed the research effort. "That's one and a half times the combined populations of North America, Europe and Russia."

"Intestinal roundworm diseases are among the most important causes of disease burden in school-aged children worldwide, leading to stunted growth, retarded cognitive and mental development and malnutrition. Children with these parasites are more likely to be trapped in poverty because of the major impact of disease on their lives. The parasites also have a significant burden on pregnant women and working adults."

But despite the huge impact of these parasites on the developing world, few drugs have been developed to effectively combat their infection in human populations. In fact, the drugs available now were mostly developed for use in veterinary medicine. Little effort has been put to directly solve and address the human intestinal roundworm problem.

"For practical reasons, only one drug, albendazole, is now widely used in administering single-dose treatments to large populations," Aroian added. "But because of the enormous numbers of people that

need to be treated repeatedly, the development of resistance to albendazole is a serious threat and is already suspected in two studies in Sri Lanka and Ethiopia. Furthermore, albendazole, as part of mass drug administrations, is a far from ideal drug, having poor impact on whipworms and incomplete impact on hookworms. A recent talk at the Society for Tropical Medicine and Hygiene annual meeting highlighted the inadequacies of albendazole in treating roundworms in South America."

The latest drug to be developed is tribendimidine, which clinically appears to be similar to albendazole, Aroian said.

But Aroian and his colleagues found in their head-to-head study of tribendimidine against an intestinal parasitic worm in mice that the Cry5B protein is *three times better* than tribendimidine.

"Comparisons in the literature with the other anti-worm drugs against this same mouse parasite, *Heligmosomoides bakeri*, indicate that Cry5B is anywhere from 4 times to 10,000 times more effective than various other anti-worm drugs," said Aroian.

"Furthermore, we found in our study that most of the Cry5B is likely degraded in the stomach, so if we can protect this protein from stomach degradation, it is likely to be an even more powerful drug against parasites than we are currently measuring," he said.

"The bottom line is that this natural soil bacterium has evolved a way of killing intestinal roundworms that is better than any drug we currently have available," Aroian said. "Our results pave the way to developing Cry5B as a safe and superior drug against roundworms that can rid a terrible class of parasites from hundreds of millions of children around the world. We are one step closer to finding a more complete treatment. Why this bacterium has evolved such a powerful anti-roundworm protein is because it is likely that roundworms and Bt interact in the wild, engaged in a sort of natural warfare with each other. If so, then the old adage 'the enemy of my enemy is my friend' may turn to our advantage here."

Yan Hu, a postdoctoral fellow in Aroian's laboratory, and Sophia Georghiou, a graduate student, performed most of the experiments in the study along with Alan Kelleher, a staff scientist in Aroian's laboratory.

The researchers were supported by grants from the National Institute of Allergy and Infectious Diseases, a part of the National Institutes of Health.In addition, two patents have been filed by UC San Diego on inventions related to the study. The specific inventions are available for licensing or commercial development through UCSD's Technology Transfer Office at

http://invent.ucsd.edu/technology/biomedical.shtml#infectious

Story Source:

Adapted from materials provided by University of California - San Diego. Original article written by Kim McDonald.

Journal Reference:

1. Yan Hu, Sophia B. Georghiou, Alan J. Kelleher, Raffi V. Aroian. **Bacillus thuringiensis Cry5B Protein Is Highly Efficacious as a Single-Dose Therapy against an Intestinal Roundworm Infection in Mice**. *PLoS Neglected Tropical Diseases*, 2010; 4 (3): e614 DOI: 10.1371/journal.pntd.0000614

http://www.sciencedaily.com/releases/2010/03/100301201935.htm

Survey Finds Genes Linked to Huntington's, Alzheimer's

This photo of Hydra was taken in a Newport Beach, Calif., stream. (Credit: Peter Bryant / UC Irvine)

ScienceDaily (Mar. 15, 2010) — UC Irvine researchers have played a leading role in the genome sequencing of Hydra, a freshwater polyp that has been a staple of biological research for 300 years.

In the March 14 online version of *Nature*, UCI biologists Robert Steele and Hans Bode, along with nine other UCI scientists and an international team of researchers, describe the genome sequence of an organism that continues to advance research on regeneration, stem cells and patterning.

The team discovered Hydra to have about the same number of genes as humans, sharing many of the same ones. Surprisingly, they also found genes linked with Huntington's disease and with the beta-amyloid plaque formation seen in Alzheimer's disease -- two areas in which UCI has traditionally strong research programs -- suggesting the possible use of Hydra as a research model for these two diseases.

"Having the Hydra genome sequenced also enhances our ability to use it to learn more about the basic biology of stem cells, which are showing great promise for new treatments for a host of injuries and diseases," said Steele, associate professor and interim chair in biological chemistry.

Started in 2004, the Hydra project is the first genome sequencing effort in which UCI scientists have played a major role. The sequencing was carried out at the J. Craig Venter Institute and was funded by the National Human Genome Research Institute.

Story Source:

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

Journal Reference:

1. Chapman et al. **The dynamic genome of Hydra**. *Nature*, 2010; DOI: 10.1038/nature08830

http://www.sciencedaily.com/releases/2010/03/100314150922.htm

Crowded Houses: Why Our Peripheral Vision May Not Be as Random as We Think

This is an image of Cinque Terre, Italy, showing "crowding." Image 1 is the normal image. Image 3 includes patches of "noise." When focusing on the center of image 3, these patches appear oriented to their surroundings. (Credit: John Greenwood and Steve Dakin, UCL)

ScienceDaily (Mar. 15, 2010) — As you read this, you may notice that the word directly in front of you is clear, but all the surrounding words are hard to make out. For most people, this effect -- known as 'crowding' -- is not a problem. However, for the millions of people worldwide who have lost their central vision through eye disease such as macular degeneration, it can make everyday tasks such as reading or recognising friends a challenge.

Despite the fact that crowding affects more than ninety-five per cent of the visual field, we know very little about how it occurs, aside from the fact that it happens not in the eye, but in parts of the brain that deal with seeing. With far fewer neurons processing inputs from the peripheral visual field in these regions compared to our central vision, the brain simplifies these areas to represent more efficiently what is in front of us.

Researchers had previously assumed that crowding makes us worse at recognising things by making our peripheral vision more random. Now, Wellcome Trust-funded researchers at UCL (University College London) and Harvard Medical School have reported in *Current Biology* that this process is anything but random.

The researchers asked volunteers to look out of the corner of their eye at a small patch of random visual noise (similar to the 'snow' seen when a TV loses its signal). When the patch of noise was surrounded by striped patches all oriented in a particular direction, the volunteers reported the 'noise' to be similarly oriented. The results suggest that crowding is actually a process that makes the world appear more regular by essentially 'blending' nearby objects together.

The researchers have used a real-world example to demonstrate the effect. Taking a photograph depicting a dramatic coastal village in Cinque Terre, Italy, the researchers 'scrambled' a large number of patches

throughout the image by swapping individual pixels within each region. However, when one's eyes are fixed on the centre of the corrupted image (for example, on the centrally-located brown house), these 'noise' patches disappear and the image appears relatively undamaged. This image was recently named runner-up in the UCL 'Research Images as Art' competition.

"We believe that this tendency of our brains to assume that the world is regular may have evolved because fewer cells in the brain are devoted to the edges of our vision compared to the centre," explains Dr John Greenwood from the UCL Institute of Ophthalmology. "In other words, the brain is not capable of delivering anything more than a simplified sketch using these resources."

The researchers believe that understanding crowding promises to reveal much about how the visual brain works, and will also reveal the best way to present television images, text and the internet for people with damage to their central vision, for example through eye diseases such as macular degeneration and amblyopia ('lazy eye').

With amblyopia, for example, it has been suggested that crowding in the 'lazy' eye may occur in central vision in addition to the normal crowding in the peripheral visual field. Similarly, in macular degeneration patients lose their central vision and must rely on their peripheral visual field.

"If we understand when crowding does and does not occur, then we could potentially create text and images that are less likely to cause crowding," says Dr Greenwood. "Similarly, if we can understand how things look when they are crowded, we could potentially generate text and images that could be recognised even when crowding has had an effect."

Story Source:

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

Journal Reference:

1. John A. Greenwood, Peter J. Bex, and Steven C. Dakin. **Crowding Changes Appearance**. *Current Biology*, 2010; DOI: 10.1016/j.cub.2010.01.023

http://www.sciencedaily.com/releases/2010/03/100304121546.htm

When Did the First 'Modern' Human Beings Appear in the Iberian Peninsula?

Iberian Peninsula. New research is stirring up scientific debate about the appearance of the first "modern" human beings on the Iberian Peninsula and their possible bearing on the extinction of the Neanderthals. (Credit: NASA World Wind)

ScienceDaily (Mar. 15, 2010) — Research carried out by a group of archaeologists from the Centre for Prehistoric Archaeological Heritage Studies of the Universitat Autònoma de Barcelona (CEPAP_UAB) at the Cova Gran site (Lleida) has contributed to stirring up scientific debate about the appearance of the first "modern" human beings on the Iberian Peninsula* and their possible bearing on the extinction of the Neanderthals.

The samples obtained at Cova Gran using Carbon 14 dating refer to a period of between 34,000 and 32,000 years in which this biological replacement in the Western Mediterranean can be located in time, although the study regards as relative the use of Carbon 14 for dating materials from the period of transition of the Middle to Upper Palaeolithic period(40,000 and 30,000).

The results also support the hypothesis that there was neither interaction nor coexistence between the two species.The work, published in the *Journal of Human Evolution*, was coordinated by Rafael Mora, Professor of Prehistory and Director of the CEPAP-UAB. Jorge Martínez-Moreno, a researcher at the CEPAP-UAB and Ignacio de la Torre, Lecturer Institute of Archaeology of University College, London also took part in the project.

Cova Gran is a large shelter discovered in 2002, located in the area of Les Avellanes-Santa Linya -La Noguera- and is one of the rare European archaeological sites to enable the study of what is known in Paleoanthropology as "transitions" or critical phases in which transformations and remodelling that are essential for reconstructing the history of our species can be detected.The investigators from the UAB have worked on an area of 60 metres squared, excavating a large area which has enabled them to reconstruct the way in which the people who inhabited the shelter lived. This system of working is not usual in archaeology since excavations are generally restricted to smaller earth movements. They have been able to recover archaeological materials from the Middle Palaeolithic attributable to Homo neanderthalensis, and from the Upper Palaeolithic, which corresponds to Homo sapiens, separated by sterile strata of sediment which allows their differentiation.

The exceptional conditions of conservation of these archaeological remains, which have remained unaffected by biological and geological changes, have meant that the materials used by each of these species has been conserved without the need for significant earth movements, contrary to that which has been indicated in other archaeological sites. This detailed analysis of the tool remains recovered allows major differences to be observed in the way in which they were made, implying that they were made by different species.This is something that has also been recognised in other sites in Western Europe, and it goes to strengthen the hypothesis that the two species neither lived together nor interacted with each other, although they may have lived in the same geographical area during the period from 40,000 to 30,000 years, which is generally referred to as the Middle/Upper Palaeolithic "transition."

Cova Gran was occupied successively by Neanderthals and "modern" humans in small groups of 15 to 20 people with a similar lifestyle: hunting, gathering, making tools for their daily activities and obtaining and

processing food for which the use of fire was essential. In spite of this, each species used very different techniques and primary materials.

Among the remains found that are attributable to *Homo sapiens* are several perforated sea snail shells, generally considered to be an indicator of the distribution of the species throughout Africa, the Middle East and Western Europe. They also denote the existence of a symbolic language and cognitive capacities for which there is no evidence during the Middle Palaeolithic These objects indicate that *Homo sapiens* travelled widely across lands from the Mediterranean coast to the Pyrenean foothills, a distance of over 150 kilometres, although the researchers do not rule out the existence of social networks which would connect groups separated by large distances and through which these objects would circulate. If this were the case, the ornaments would be a key symbolic element in the social structure of this people and a clue to their identity.

The work also offers new data about the period in which the first representatives of the so-called "modern humans" appeared in the Iberian Peninsula and the extinction of the Neanderthals, a question that has generated some heated debate within the area of Paleoanthropology. The Carbon 14 dated samples in Cova Gran make references to a period of between 34,000 and 32,000 years in which this biological replacement in the Western Mediterranean can be located in time.

Notwithstanding, the study also discusses the validity of C14, the method habitually used to date archaeological remains from that period. Although C14 is a vital tool for dating archaeological sites, one conclusion to emerge from the study is that the period between 40 and 30 thousand years cannot be considered as "historic" years. This observation has rekindled the controversy that has existed for some time in archaeology about whether C14 is a totally reliable timepiece. The radioactive isotope regularly disintegrates but from 30,000 years its presence in samples is residual and, in many cases, the samples have been exposed to processes of change that are difficult to identify. The researchers argue that much of the data that is usually obtained in studies of this period may correspond to samples that have been contaminated or have been treated in laboratories using methods that have failed to detect this type of problem. Currently improvements are being developed which it is hoped will eliminate this uncertainty.

The Cova Gran site covers a total surface area of 2,500 metres squared and contains an important archaeological heritage. Future excavations will enable more profound investigations into how modern humans settled in the Iberian Peninsular and their evolution over the last 40,000 years.

*The Iberian Peninsula, or Iberia, is located in the extreme southwest of Europe and includes modern-day states Portugal, Spain, Andorra and Gibraltar and a small area of France.

Story Source:

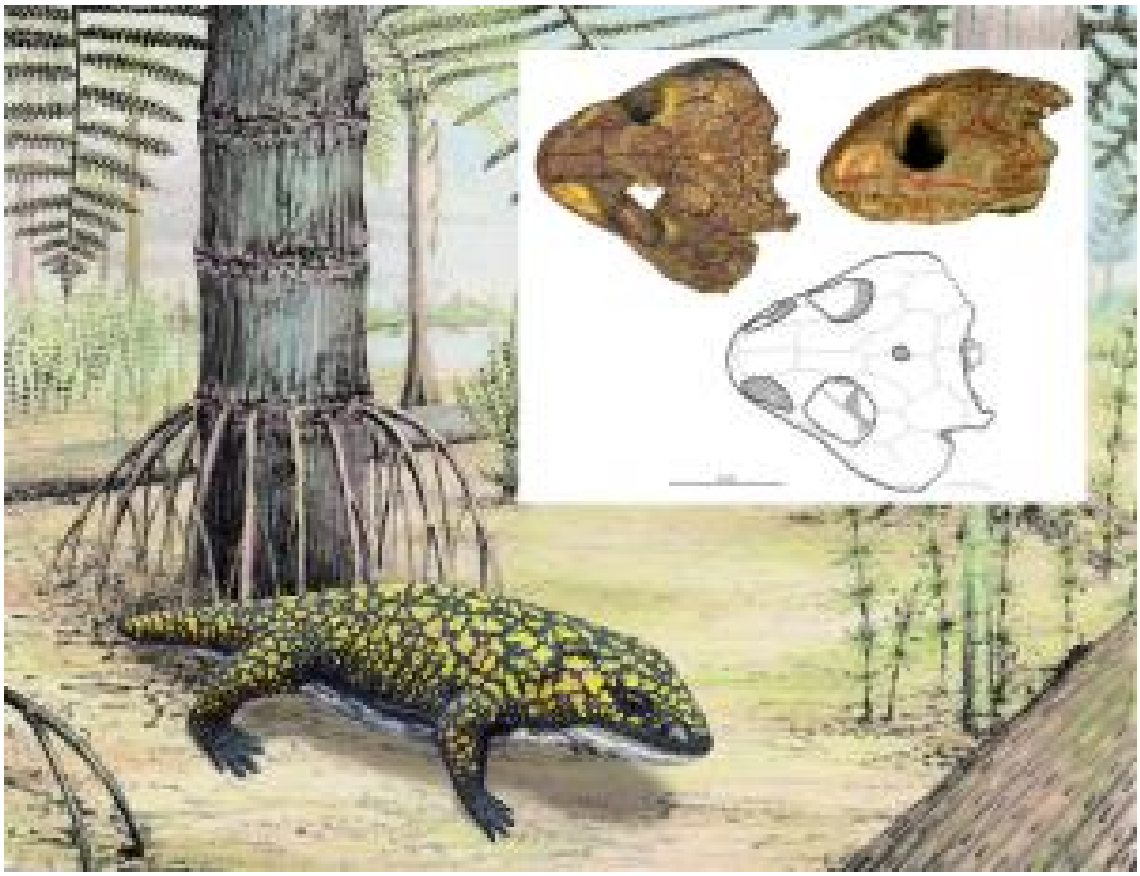
Adapted from materials provided by Universitat Autonoma de Barcelona, via EurekAlert!, a service of AAAS.

Journal Reference:

1. Martínez-Moreno et al. **The Middle-to-Upper Palaeolithic transition in Cova Gran (Catalunya, Spain) and the extinction of Neanderthals in the Iberian Peninsula**. *Journal of Human Evolution*, 2010; 58 (3): 211 DOI: 10.1016/j.jhevol.2009.09.002

http://www.sciencedaily.com/releases/2010/03/100315103938.htm

Fossil of Early Terrestrial Amphibian Discovered



Fedexia striegeli in the environment of the Pennsylvanian Period (300 million years ago). Inset: Views of the remarkably preserved Fedexia striegeli skull. (Credit: Reconstruction by Mark A. Klingler/Carnegie Museum of Natural History / Inset graphics by Mark A. Klingler/Carnegie Museum of Natural History)

ScienceDaily (Mar. 15, 2010) — A team of researchers from Carnegie Museum of Natural History has described a new genus and species of carnivorous amphibian from western Pennsylvania. The fossil skull, found in 2004 near Pittsburgh International Airport, was recovered from rocks deposited approximately 300 million years ago during the Late Pennsylvanian Period. Named *Fedexia striegeli*, it is one of only a very few relatively large amphibian fossils to display evidence of a predominantly terrestrial (land-based) life history so early in geologic time.

The rocks where *Fedexia* was found are nearly 20 million years older than the localities of its fossil relatives, suggesting that the expansion and diversification of this group occurred much earlier than had been recognized previously. The full paper are being released in *Annals of Carnegie Museum,* Volume 78, Number 4, 15 March 2010.

Fedexia was described on the basis of a remarkably well-preserved fossil skull. Unlike similar discoveries, the five-inch-long (11.5 cm) fossil skull remained three-dimensional over time because it was never crushed by rocks that were deposited above it. *Fedexia striegeli* was named for FedEx, the corporation that owns the land on which the fossil was found, and for amateur discoverer Mr. Adam Striegel, who originally found the specimen on a geology field trip while a senior at the University of Pittsburgh.

Climate Change Likely a Factor

Fedexia represents an extinct group of amphibians called Trematopidae that lived about 70 million years before the first dinosaurs appeared. Unlike almost all other Pennsylvanian Period amphibians, which did not often venture out of the water, this rare, diverse group lived mostly on land, returning to the water perhaps only to mate or lay eggs. The trematopids also provide evidence of the earliest vertebrate life in North America adapted to a mostly terrestrial existence. Their success may have been a result of a long-term, global trend toward drier, warmer conditions that reached its climax near the end of the Pennsylvanian Period.

At the time of *Fedexia*'s preservation, the earth's climate was in a period of transition. Immense glaciers in Earth's southern polar region produced rapidly fluctuating global climates. Western Pennsylvania, which was near the equator at that time, experienced tremendous amounts of rain. Swamps which would later develop into coal developed, and amphibians -- which are dependent on moist conditions -- flourished; in fact, the Pennsylvanian Period is known as the "Age of Amphibians."

Gradually, however, as an increasing amount of the planet's water became locked up in polar ice, the sea level dropped and more land was exposed. Vast regions of the earth became drier and warmer, including the region that would become western Pennsylvania. The coal swamps and lakes dried up, and many of the coal-forming plants became extinct. It was at this time that amphibian populations in what would become the Pittsburgh region shifted from mainly aquatic to mainly terrestrial, paralleling the change in climate from tropical to semi-arid. Vertebrates that had already begun adapting to terrestrial life -- including amphibians closely related to *Fedexia striegeli* -- became far more abundant, widespread, and diverse than their relatives who were still dependent upon cooler, moist environments.

The large number of trematopid amphibians appearing in the fossil record in the Permian Period suggests that climate change was a major factor in the diversification of terrestrial amphibians. The appearance of *Fedexia* during the Pennsylvanian Period -- 20 million years earlier than the Permian -- was an early indicator of the diversification that was to come. Co-author David Brezinski states, "The one-to-one correspondence between this early appearance of trematopids in the fossil record and the preservation of dry climate indicators in the surrounding rock units suggests that this is a climatically driven immigration and/or origination event."

Although the appearance of *Fedexia* and other highly terrestrial vertebrates in the fossil record seems sudden, this is undoubtedly misleading. They or their close relatives had probably already existed for a few million years, occupying upland regions where conditions for fossil preservation were not optimal. However, the climatic change to drier, warmer conditions led to an explosive dispersal of terrestrial vertebrates to coastal regions and lowlands -- including western Pennsylvania -- where accumulating sediments increased the chances for fossil preservation. Because western Pennsylvania is the "type stratigraphic sequence" -- or best record -- of sediments deposited during the Pennsylvanian geologic period, this region offers exceptional opportunities for future discoveries of terrestrial vertebrate fossils of this age.

A Remarkably Preserved Fossil

Fedexia striegeli was described on the basis of a remarkably well-preserved fossil skull. Unlike many other fossil finds, the fossil skull remained three-dimensional and did not suffer post-mortem crushing over time by the compaction of rock formations above it. The preservation of the skull is so precise that even the middle-ear bone, known as the stapes, remains perfectly intact and in its correct position, a very rare discovery in fossils.

Owing to the remarkable preservation of the skull, *Fedexia* was easily identified as a trematopid, mainly by the hallmark feature of the group, a greatly elongated external nasal opening that is partially subdivided into fore and aft portions. Some scientists speculate that the posterior division held a gland -- similar to that in some modern-day reptiles and marine birds -- that rid the body of excess salt, or perhaps enhanced the sense of smell; either function would have been an advantage for a terrestrial existence. *Fedexia* is the first trematopid to be found in Pennsylvania, and only the third in the world of Late

Pennsylvanian age, the group's earliest appearance. Now that the immediate study of *Fedexia striegeli* is complete, the fossil has been permanently preserved for future research in the Carnegie Museum of Natural History vertebrate paleontology collection. Casts of the skull will be given to FedEx Corporation and to Mr. Striegel.

According to co-author David S Berman, "What is particularly amazing about this discovery is that it was made by an amateur who had no prior experience in recognizing vertebrate fossils in the rock, a talent that usually takes years to develop."

Publication in *Annals of Carnegie Museum*

The paper *A New Trematopid Amphibian (Temnospondyli: Dissorophoidea) from the Upper Pennsylvanian of Western Pennsylvania: Earliest Record of Terrestrial Vertebrates Responding to a Warmer, Drier Climate* was authored by Curator of Vertebrate Paleontology David S Berman, PhD, Vertebrate Paleontology Collection Manager Amy C. Henrici, Adjunct Associate Curator of Invertebrate Paleontology David K. Brezinski, PhD, and Invertebrate Paleontology Collection Manager Albert D. Kollar, all of Carnegie Museum of Natural History.

Story Source:

Adapted from materials provided by Carnegie Museum of Natural History.

http://www.sciencedaily.com/releases/2010/03/100315144812.htm

Carbon Emissions 'Outsourced' to Developing Countries

China is by far the largest "exporter" of carbon dioxide emissions, as seen in this map of the net flow of emissions embodied in trade among the major exporting and importing countries. Arrows indicate direction and magnitude of flow; numbers are megatons (millions of tons). (Credit: Steven Davis/Carnegie Institution for Science)

ScienceDaily (Mar. 15, 2010) — A new study by scientists at the Carnegie Institution finds that over a third of carbon dioxide emissions associated with consumption of goods and services in many developed countries are actually emitted outside their borders. Some countries, such as Switzerland, "outsource" over half of their carbon dioxide emissions, primarily to developing countries. The study finds that, per person, about 2.5 tons of carbon dioxide are consumed in the U.S. but produced somewhere else. For Europeans, the figure can exceed four tons per person. Most of these emissions are outsourced to developing countries, especially China.

"Instead of looking at carbon dioxide emissions only in terms of what is released inside our borders, we also looked at the amount of carbon dioxide released during the production of the things that we consume," says co-author Ken Caldeira, a researcher in the Carnegie Institution's Department of Global Ecology.

Caldeira and lead author Steven Davis, also at Carnegie, used published trade data from 2004 to create a global model of the flow of products across 57 industry sectors and 113 countries or regions. By allocating carbon emissions to particular products and sources, the researchers were able to calculate the net emissions "imported" or "exported" by specific countries.

"Just like the electricity that you use in your home probably causes CO_2 emissions at a coal-burning power plant somewhere else, we found that the products imported by the developed countries of western Europe, Japan, and the United States cause substantial emissions in other countries, especially China," says Davis. "On the flip side, nearly a quarter of the emissions produced in China are ultimately exported."

Over a third of the carbon dioxide emissions linked to good and services consumed in many European countries actually occurred elsewhere, the researchers found. In Switzerland and several other small countries, outsourced emissions exceeded the amount of carbon dioxide emitted within national borders.

The United States is both a major importer and a major exporter of emissions embodied in trade. The net result is that the U.S. outsources about 11% of total consumption-based emissions, primarily to the developing world.

The researchers point out that regional climate policy needs to take into account emissions embodied in trade, not just domestic emissions.

"Our analysis of the carbon dioxide emissions associated with consumption in each country just states the facts," says Caldeira. "This could be taken into consideration when developing emissions targets for these countries, but that's a decision for policy-makers. One implication of emissions outsourcing is that a lot of the consumer products that we think of as being relatively carbon-free may in fact be associated with significant carbon dioxide emissions."

"Where CO_2 emissions occur doesn't matter to the climate system," adds Davis. "Effective policy must have global scope. To the extent that constraints on developing countries' emissions are the major impediment to effective international climate policy, allocating responsibility for some portion of these emissions to final consumers elsewhere may represent an opportunity for compromise."

The report is published online in the March 1, 2010 *Proceedings of the National Academy of Sciences*.

Story Source:

Adapted from materials provided by Carnegie Institution.

Journal Reference:

1. Steven J. Davis and Ken Caldeira. **Consumption-based accounting of CO2 emissions**. *PNAS*, March 8, 2010 DOI: 10.1073/pnas.0906974107

http://www.sciencedaily.com/releases/2010/03/100308151041.htm

Confidence Is Key to Gauging Impressions We Make

Researchers Simine Vazire (left) and Erika Carlson of Washington University in St. Louis find that people should trust their gut when gauging what sort of first impression they've made. (Credit: WUSTL Photo)

ScienceDaily (Mar. 15, 2010) — The gift of "seeing ourselves as others see us" is particularly beneficial when we judge how we've made a first impression -- in a job interview, during a sales pitch or on a first date.

Yet, many come away from these situations with at best a vague notion of how that first impression was perceived or at worst no clue at all.

Now, psychologists at Washington University in St. Louis and Wake Forest University have tested people in first impression settings in the laboratory and have found that confidence makes all the difference in knowing whether you've hit a homerun or struck out.

Erika N. Carlson, a doctoral candidate in the Department of Psychology in Arts & Sciences; her advisor Simine Vazire, Ph.D., assistant professor of psychology; and Wake Forest University's R. Michael Furr, Ph.D., engaged some 280 students in opposite-sex pairings from both universities in five-minute conversation after which impressions (your rating of your partner's personality traits) and metaperceptions (your rating of how you think your partner rated your personality traits) were recorded on 60 personality items (such as nice, funny, outgoing), which were rated on a scale from 1 to 7.

There was a twist to their study. The researchers asked a confidence question: How confident are you in your estimation of how your partner sees your personality?

"In the past, researchers hadn't asked whether you know when you're accurate in first impressions, nor your degree of confidence," Carlson says.

"We found that people who were poor at making good meta-impressions were less confident than people who made accurate ones. So, after making a first impression, if you're confident in your judgment, you're likely to be right."

The research was recently published in *Social Psychological and Personality Science.*

At the crux of knowing you've made a good impression is something called calibration, or "being confident when you're right and uncertain when you're wrong," says Vazire. "Not well-calibrated people are confident when they're wrong and uncertain when they're right.

The confidence and accuracy questions in our study shed light on participants' calibration."

She likens accurate calibration to a sort of internal gauge.

"You think, 'This is the impression I think I made.' And the internal gauge tells you to go ahead with that impression, you're probably right," she says. "Or, gather more information, you might be wrong. So, well-calibrated people have a good internal gauge."

The goal of their research is to enable people to trust the confidence of their first impressions and pursue the next step, Carlson says.

When you have misjudged the way others see you, the result is often a bad decision, says Carlson. "You might have thought that the date you went on went well and she liked you, but it went wrong in the date's eyes and she doesn't like you. Your next move could be embarrassing and painful," she says.

We're sometimes wrong about the impressions we've made, Vazire says.

"We might think that obviously the other person could tell that I hated them, or that I obviously liked them, or obviously my brilliance came across, but we've all been wrong, so it's important in any number of social settings when to actually doubt how you've come across," she says.

Future metaperception research will explore videotaped first impression interactions from calibration studies to determine which factors affect calibration, like verbal or non-verbal clues, which might reveal who formed accurate metaperceptions and who didn't, who was wellcalibrated and who wasn't, and perhaps more importantly, why people understood the impressions they made. Such clues could be in overt behaviors like talking rates, smiles, how close the participants sat to each other, or more subjective things like the intimacy of the conversation.

Carlson says there is some preliminary evidence that when one person is more accurate in metaperceptions, their partner also is, suggesting that there might be something unique to relationships that influences whether we can pick up on the impression we've made.

With the exception of someone like Michael Scott (the totally clueless boss in the TV sitcom "The Office"), people have a surprising level of self-knowledge in judging their first impressions, says Carlson.

"For the most part, people understand when they're right and when they're wrong," she says. "If you want to know if you've made the right impression, trust your gut."

Story Source:

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

Journal Reference:

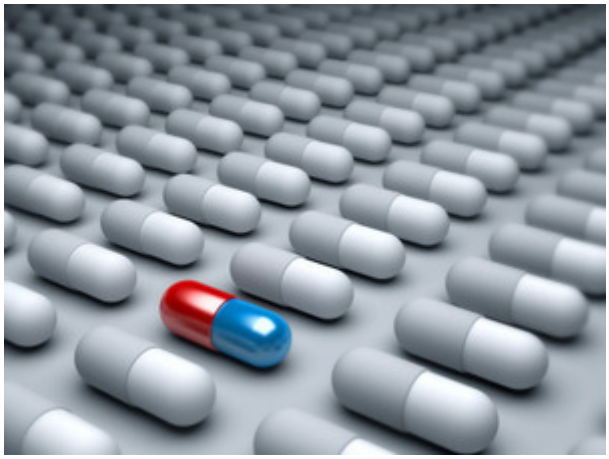
1. Erika N. Carlson, R. Michael Furr, and Simine Vazire. **Do We Know the First Impressions We Make? Evidence for Idiographic Meta-Accuracy and Calibration of First Impressions**. *Social Psychological and Personality Science*, 2010; 1 (1): 94 DOI: 10.1177/1948550609356028

http://www.sciencedaily.com/releases/2010/03/100310142451.htm

The Growing Power Of The Sugar Pill

by Alix Spiegel

March 8, 2010



iStockphoto.com

In drug-testing, the researchers usually don't know which patients get the drug and which get the placebo.

The other day I came across a fake news story on the Internet. It was a send-up of the pharmaceutical industry which featured a bunch of drug industry executives wringing their hands in despair: placebo pills, the fake news story reported, were getting stronger, what was a drug executive to do?

This is a *real* news story about how placebos are getting stronger. Or anyway, it's a story about how our assumptions about placebos — the proverbial sugar pills given to patients during medical trials — are changing.

But to understand this story first you need to understand more about how important placebos and the placebo effect have become to the process of medical research. To do that, it's good to get to know Annette and George Doeschner.

You see a long time ago, when they were still young, Annette and George decided to go for a walk in the park near their home.

It was a beautiful day, the sun was shining, and everything was perfect. Everything except for George's arm.

"His left arm wasn't moving," says Doeschner. "And I noticed and I said, 'Why isn't your arm moving?' And he said, 'I don't know, but my pinky is twitching and I don't understand what that is.' "

Annette encouraged George to see a doctor about his pinky, and so he did. But the doctor had bad news. George, a 40-year-old father of four, had Parkinson's.

Annette says the diagnosis felt like a death sentence, but there was one small ray of hope: science. The doctors assured George and Annette that the disease was slow moving, and that scientists were coming up with treatments all the time.

A Possible Treatment

And in fact, ten years later, George and Annette got wind of a promising possibility.

As part of an experimental study a doctor in Colorado was injecting fetal tissue into the brains of people with Parkinson's. The researchers believed that the experiment was relatively safe, but there was one catch: 40 people would be accepted into the study, but only 20 would get the real operation. Twenty would get a placebo operation; they'd go through everything that the real patients went through without getting the fetal tissue.

So why go through this pain and trouble? Because the doctor knew that even fake surgery — placebo surgery — will often give people relief. And, he felt he needed to compare the effect of the real operation with a fake one. That way he would know what effect the fetal tissue really had.

George agreed and flew to Colorado where the doctor screwed a metal crown into George's head and drilled four holes through his skull. George was then sent home.

Several months later, after a series of tests, George finally got more news about the experiment. Turned out he hadn't gotten the real operation; he's gotten the placebo surgery.

When George Doeschner was diagnosed with Parkinson's, he and his wife, Annette, decided he'd take part in some experimental treatments to fight the disease.

When George Doeschner was diagnosed with Parkinson's, he and his wife, Annette, decided he'd take part in some experimental treatments to fight the disease.

You might think that, once told, he'd be a little bit put out about the four holes in his head. But Annette says no. She explained that she and George understand just how important placebos are. "How they ever do it I don't know, but that's the way that science works," she says plainly. "This is science."

The Placebo Effect

Over the last four decades placebos have come to play an enormous role in the scientific process. So enormous that even people like George and Annette understand their importance, are willing to tolerate literal holes in the head because they believe that it's only through testing against placebos that scientists are able to understand what is really going on.

But some recent studies are turning up something extremely unexpected about the placebo effect: our response to placebos seems to be changing over time. In fact the placebo effect, some researchers say, appears to be getting stronger.

To understand why it is that the placebo response might be changing, you first have to understand the role that placebos play in our research process. Because doctors know that any kind of medical intervention — even a fake one — can cause people to improve, they use placebos like sugar pills or fake surgery to understand whether or not a treatment is really working.

And why do these placebos — - the sugar pill, the fake operation — sometimes seem to make people better when there's absolutely nothing to them? Arthur Barsky, the director of psychiatric research at Brigham and Women's Hospital in Boston, says one big reason is conditioning.

"You've learned over the course of your life that going to the doctor, being examined, having him write out a prescription, waiting in line at the pharmacy, taking a pill, (these things) are generally followed by

some benefit," Barsky says. "So you've kinda learned a pattern of reacting that seems to be pretty powerful."

Therefore the mere fact of participating in these activities, Barsky says, often makes you feel better.

Now this is incredibly important when it comes to drug trials — studies that try to figure out whether or not a drug is working. Researchers testing a new medication feel that because of the placebo effect, they can't just give their drug to patients then ask them how they feel, because patients are liable to report the drug is helping when it's just the act of taking medicine that's making them feel better.

Barsky says this is the real question: "Is your new medication more effective than a sugar pill?"

And so most of the time when there's a drug study in this country, the drug is compared to a placebo. But, says Barsky, this whole system is premised on some big assumptions about *how* placebos work.

"We have always assumed that it was a pretty constant effect. That the same person would have the same response to a placebo at different points in time. That similar illness would respond in a similar way to placebo. It was a constant, predictable, stable, and very important phenomenon that you saw in any medical interaction."

Our Response To Placebos May Be Changing

But it turns out the placebo effect might not be as stable as we've assumed. Barsky recently published a study that looked at a bunch of antidepressant trials that had taken place between 1980 and 2005, and he found that in 2005 patients in these trials responded to placebos way more than patients did back in the 1980s.

"The placebo response was about twice as powerful than it was in the 1980s," Barsky says. "That's a pretty significant difference."

In other words, placebos seemed to be twice as powerful as they were 30 years ago.

No one, including Barsky, really knows why the placebo effect appears to be changing. But Ted Captchuk, another Harvard professor who studies the placebo effect, says that placebo "drift" as it's now known, appears to be real. He says it's shown up in more than just antidepressant trials. And one possible explanation, according to Captchuk, is that there's been a change in our expectations.

For example, Chaptchuk points out that by 2005 our belief in the power of antidepressant drugs was very strong, and that might account for the shift. "There's a lot of confidence, and that changes both providers impression of what happened, and presumably the patient's experience of what could happen."

But also, says Kaptchuk, it could be that because drug companies mostly pay for drug experiments, doctors who do the research have a subtle incentive to say the drugs are working. And since doctors don't know who's taking a real pill and who's not, the fact that they see benefits in all patients would also inflate the placebo effect.

Then there's another possible explanation.

Researchers, especially in pharmaceutical trials, get paid for every patient they recruit. But often, Kaptchuk says, it's hard to find people, so doctors will sometimes admit patients to trials who simply aren't that depressed. And typically, he says, people who aren't that depressed are much more susceptible to the placebo effect.

"I don't think there's out-and-out fraud," says Kaptchuk. "I think that you're under pressure to recruit. It's really hard to recruit people. And you know, (when) it's borderline, (you) put them in. And those people on the borderline at the end, they are better in the placebo group."

Whatever the cause, placebo drift is something that has the potential to cause real mischief in medical trials.

"If the placebo response — that baseline — is shifting all the time, then it really confuses the issue of whether the drug is effective or not," Barsky points out.

Faith In Science

As for Annette and George Doeschner, their experience with both placebo and "the real thing" has been mixed.

Years ago, after learning that George had had the placebo operation, they decided to go back and get the real thing. And at first, Annette says, it worked great: the tremors went away.

But then George started getting wild movements. His arms and legs would jump out uncontrollably at odd times. So George and Annette decided to go in for a new kind of operation: deep brain stimulation.

DBS, as it's known, quieted much of the wild shaking. George and Annette are pretty happy with it, but still Annette says: "We'd be happier with a cure."

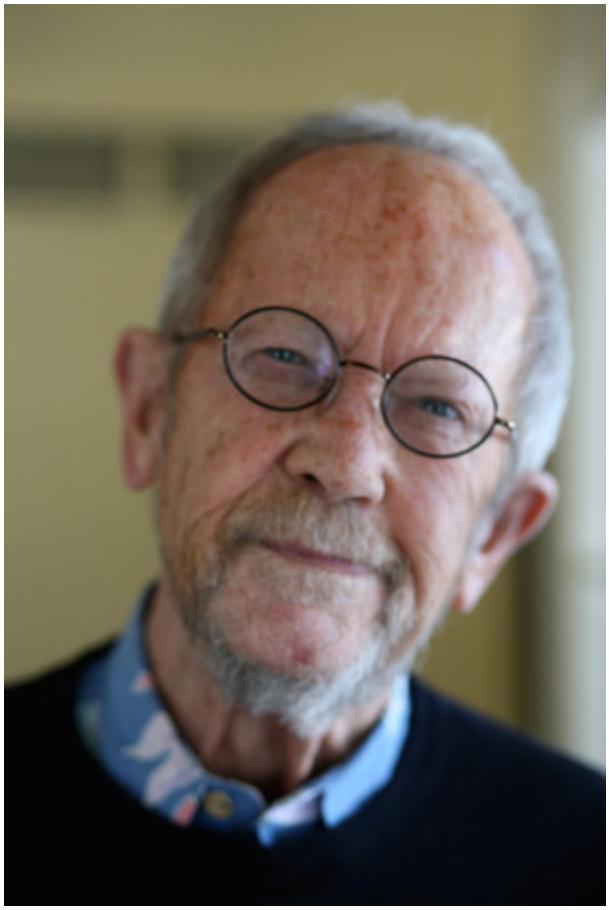
And, were another potential promising cure to come along, Doeschner says, she and her husband might consider signing up for another experiment. Even if it involved a placebo.

http://www.npr.org/templates/story/story.php?storyId=124367058&sc=nl&cc=hh-20100315

Elmore Leonard, At Home In Detroit

by Noah Adams

March 16, 2010



Author Elmore Leonard at his home in Bloomfield Village, Mich.

Elmore Leonard Tells Noah Adams About The Writers -- Obvious And Obscure -- Who Helped Him Develop His Style

March 16, 2010

For six decades, Elmore Leonard has been sitting at his writing desk, first in Detroit, then in the suburbs, creating robberies and murders for books and movies. Hollywood has tried many times to translate Leonard's work from page to screen: *Get Shorty*, *Out of Sight*, two versions of *3:10 to Yuma.* Leonard has written several screenplays too, and worked on the recent, short-lived ABC television series *Karen Sisco.*

Tonight, another television network — FX this time — takes a shot at bringing Elmore's World to life. Leonard himself is an executive producer of *Justified*, but he says there are a whole bunch of those, and he doesn't have script approval.

But Leonard's happy. He's met the writers, and they're keeping their source close at hand.

"They said, 'We all have this little plastic bracelet on that says WWED — What Would Elmore Do?' " Leonard says. "It seems to me that they sound like my writing."

What Would Elmore Do? Take, for starters, the advice he says he gave to *Get Shorty* director Barry Sonnenfeld on how to balance dark humor and menace.

"I said, 'When these guys say something funny, you don't cut away to get laughs because they're serious. They're all serious,' " Leonard says.

It's advice worth heeding. Leonard has written 43 books, almost all of which have been optioned for films. His fans — there are many — say he's the best crime writer ever, and they can recognize any page based on the sound.

"Well, when people ask me about my dialogue, I say 'Well, don't you hear people talking?' That's all I do. I hear a certain type of individual," Leonard says. "I decide this is what he should be, whatever it is, and then I hear him. Well, I don't hear anybody that I can't make talk."

Leonard also uses names he likes the sound of. He once met a man named Raylan at a book fair, and created Deputy U.S. Marshal Raylan Givens, from Harlan County, Ky. Givens appeared in two novels by Leonard as well as the short story "Fire in the Hole" that is the basis for *Justified.*

In the show, Givens wears a white Stetson and only pulls his sidearm if he intends to use it, as in a scene from the pilot where Givens (played by Timothy Olyphant) gives a thug an ultimatum: Get out of town, or die.

Just in case the television guys run out of stories, Leonard says he hasn't been able to resist working on an idea of his own for *Justified.* He's about 20 pages into a storyline about body parts that starts as Givens enters a motel room to make an arrest.

"It's quiet, and the guy's not in the bed," Leonard says. Givens goes into the bathroom to find his suspect "in an ice bath, naked, lot of crushed ice up to his chin, hair back, and both of his kidneys are missing. So Raylan wonders, well they took his kidneys to sell them." Leonard chuckles. "But why did they keep him alive?"

In Detroit

On a nice day in Detroit, you might take your kids to Bell Isle, near downtown, to feed the geese. Or, if you're a crime writer, you might set a scene here. Perhaps, in the icy dark, a murder weapon goes into the Detroit River, or a car blows up on the bridge.

Leonard still remembers when Detroit had 700 murders a year. And any tour of Leonard's city will stop in front of the police headquarters on Beaubien, at No. 1300. Leonard spent long weeks at the station, and in the bars nearby, listening to the homicide detectives. He recalls sitting in the courtroom at the Frank Murphy Hall of Justice, taking notes about stories that wouldn't occur to a fiction writer.

"That house was on fire last time I saw it," Leonard says, pointing at a red house. "That's the opening scene in *Mr. Paradise.* Three bodies."

Three people shot in the head, to be exact, one sectioned by chain saw. The red house from Leonard's 2002 novel was near a White Castle, close to Tiger Stadium, which a character describes in the book as "that famous old ball park of no use to anybody."

Pulling up to the curb at that site, Leonard gets a surprise. The stadium was demolished last year; he has fewer words for what remains: "Jeez ... where ... there's nothing left."

At Home

Twenty-four miles from where Tiger Stadium used to stand, where Leonard and his wife, Christine, live in a handsome house, in a fine neighborhood, the author pulls a book from the shelf.

The Bounty Hunter was Leonard's first book, published in 1953. The cover reads, "A Novel by Elmore Leonard about a time when an Apache scalp would bring 500 pesos in Mexico."

Elmore Leonard's writing desk at his home near Detroit. Leonard writes each page of his books by hand, on canary yellow paper.

At the time, Leonard had been writing Western short stories for two cents a week, getting up at 5 a.m. He found he was good at Westerns, and he left his job writing copy for Chevrolet ads.

Every page, from 1961's *Hombre* to last year's *Road Dogs,* has been handwritten on canary yellow paper. Leonard orders a year's supply at a time, "50 pads of 60 pages per pad."

"I've been using this paper ever since I left the ad agency where they used these pads," Leonard says. "I like them but I always write in longhand before I put it in the typewriter."

Leonard is still writing Westerns, only now on a global scale. The next book to come from this desk is about terrorism, piracy, and al-Qaida. It's called *Djibouti,* and it's due in November.

"I said to my editor, 'Well, I'm gonna call my next one *Djibouti'* before I started to write it," Leonard says. "He said, 'Well, you can't use Djibouti. You could use maybe with another word or two with it, might work.' I said, 'It's *Djibouti.* And that's it.' "

http://www.npr.org/templates/story/story.php?storyId=124736822

Scientists Still Hopeful About Gene Therapy's Promise

by Joe Palca

March 8, 2010

Paul Sakuma/AP

Twenty-five years ago, it seemed as if gene therapy was on the verge of revolutionizing medicine. But that revolution never occurred, and scientists realized that they had been overly optimistic about how quickly they could develop such therapies.

Now, however, there are signs that the field of gene therapy is making definite progress, even if the revolution is still on hold.

The concept of gene therapy is simple. Some diseases are caused by damage to a single gene — for example, cystic fibrosis and hemophilia. Give patients the healthy gene, and in theory, the disease is cured.

From Radical To Reliable: The Rise Of A Medical Treatment

First described as a cancer treatment in the Sept. 12, 1957, issue of the *New England Journal of Medicine*, bone marrow transplantation did not achieve widespread acceptance until the 1990s. Experts say that gene therapy is on a similar track, and the treatment is on the verge of taking off clinically, much like bone marrow transplantation did in the early 1980s.

Dr. Mark Kay, who now runs the gene therapy program at Stanford University, says that in the early days of gene therapy, it turned out to be extremely difficult to get healthy genes into the cells that needed them.

"If we saw one cell out of a million, or even 10 million or 100 million, that were genetically modified with the gene therapeutic, we would be excited," he says.

How Gene Therapy Works

It's no simple job to get genes into individual cells, but there is one organism that is extremely good at it: a virus.

"What a virus does is deliver its own genetic material to a cell," says Ken Cornetta, president of the American Society of Gene and Cell Therapy.

A technician at pharmaceutical company pursuing new gene therapy treatments collects re-engineered viruses, called "vectors." Viruses, stripped of their virulence and ability to replicate, are the most common delivery vehicles for healthy DNA.

Inside A Gene Therapy Breakthrough

With one injection of an experimental gene therapy treatment, doctors have significantly improved the sight of people born with a rare congenital vision disorder .

"What we can do in the setting of gene therapy is to re-engineer that virus to allow it to do what it does best, which is deliver genetic material to a cell. But we can also remove the viral genes, and replace them with the genes that we need to deliver to the cell to treat the disease," he says.

But there were problems. When scientists used viruses to insert genes into patients, their immune systems tried to fight off the virus. And then, when the genes did get in, in some cases they switched on other genes that caused cancer, making the cure nearly as bad as the disease.

"The field was in big trouble 10 years ago, says Joseph Glorioso, a researcher and editor of the journal *Gene Therapy*. "A lot of people were disillusioned — 'Oh this is never going to work, we thought it would be easy,' and all that."

But Glorioso says gene therapists are a stubborn bunch, and despite the setbacks, many researchers kept at it. He says many therapies take a long time to make it from the lab bench to the bedside.

Take bone marrow transplants. They were first attempted in the 1950s, but it wasn't until the 1980s that they began to be used routinely to treat leukemia and other blood disorders.

A Reason To Be Optimistic

The field of gene therapy is now seeing positive results. Scientists have found new ways to modify viruses to make them better at delivering genes, and several studies are showing that the gene therapy can effectively treat an array of disorders.

There's a therapy for a rare immune disorder called ADA deficiency, and more recently scientists at the Children's Hospital of Philadelphia reported dramatic success using gene therapy to treat a rare inherited form of blindness. It was a small study — only 12 subjects.

"All of the subjects showed improvement," says Kathy High, a Howard Hughes Medical Institute investigator and one of the leaders of the study. She says the improvement was greatest for the children in the study.

High says we should expect to hear more success stories in the coming months and years — and not just for rare disorders, but for more common diseases like AIDS and cancer.

"I really do think that the field, you know, after a long labor, is beginning to deliver," says High. "It's a nice time to be working in this field."

Maybe now, scientists' optimism is justified.

http://www.npr.org/templates/story/story.php?storyId=124355459&sc=nl&cc=hh-20100315

Just Add Water: Colorado Delta Resurrects

By: Ben Preston | March 15, 2010 | 05:00 AM (PDT) |

Once written off, the Delta of the Colorado River has found a hardy band of NGOs and local governments willing to sweat to keep it wet.

In this installment of our series on the Lower Colorado River, conservation and restoration efforts on the Mexican side of the International Border will be explored. Stay tuned for the final installment, which will examine cooperation between American and Mexican entities. The Colorado River conservation community is tight-knit, but there are transnational political considerations to be made when working with a natural resource that isn't confined by political boundaries.

Driving across the western edge of the dusty, barren Sonoran Desert south of the border between the United States and Mexico, it's easy to get the feeling that if it weren't for the regular occurrence of irrigation ditches, there wouldn't be any water there at all.

The fields are green, but everything, from crop leaves to cars to houses, is covered with a fine, dry dust. From Yuma, Ariz., through San Luis Rio Colorado, Sonora and through the busy agricultural area on the way to the Gulf of California — also known as the Sea of Cortez — farms become less frequent and the terrain more featureless.

After a particularly jarring few miles on unpaved washboard roads, a little hamlet called Ejido Luis Encinas Johnson appears, the desert beyond the palm tree-bedecked oasis unfolding into a vast tan sheet. It takes another 20 minutes or so to drive across the shifting desert sand on a vaguely defined track until the Ciénega de Santa Clara wetland — 12,000 acres of reed-choked marsh that today makes up the terminus of the Colorado River Corridor — appears on the horizon.

Because Mexican government agencies can't afford complicated tertiary sewage treatment plants, they rely on nature to remove contaminants from wastewater before returning it to Rio Colorado. The Las Arenitas Wastewater Treatment Plant was installed in 2007, with NGOs and now the federal government working hard to plant filtering wetlands along the edges of its drainage basin. (Ben Preston)

Before the 20th century, when the great Colorado River dams were built, the river took a course similar to my driving route as it meandered across the gradually flattening alluvial plain stretching from Southern Nevada to the Gulf. Yuma was a port city and large steam ships regularly traveled to and from San Francisco, transferring freight onto barges at Yuma to ship further up river.

Today, several dams along its course — two, the Hoover and Glen Canyon dams, are among the more colossal structures ever conceived by human engineering — along with reservoirs, levees and diversion canals, have bent the river to the will of human activity.

Just before it reaches Yuma, the Colorado is diverted east and west to the great farms of California's Imperial Valley and to Southern Arizona. Once wild and unpredictable, prone to violent, muddy floods, what is left of the Colorado now obediently gurgles toward the border crossing in a small channel, where it is again diverted by Morelos Dam in order to provide Mexican farms and communities the annual 1.5 million acre-feet they are guaranteed by treaty to receive. From there, it abandons any semblance of its original course, tracking west into Mexico's irrigation system toward the populous Mexicali Valley, which currently has almost 500,000 acres of irrigated farmland in production. With no direct connection to the river, the Delta is fed instead by agricultural return flows and very occasional rainfall.

When the Hoover Dam — almost 250 miles upstream from the Delta — was completed in 1936, it took several years for Lake Mead to fill.

During that time, scarcely any water reached the Delta, and it began to dry up. From 1963 until 1981, as Lake Powell filled behind Glen Canyon Dam, the Delta experienced a much longer dry spell, this time all but disappearing. Native plants withered and died on the desiccated land, and many insects, fish, birds and mammals — including such formerly prolific species as the desert pupfish, the Yuma clapper rail, the vaquita porpoise and the Colorado delta clam — began to disappear, too.

The drastic changes forever altered life for the Kwapa (or Cocopah) Indians, a semi-nomadic tribe whose people had hunted, fished and lived their lives around the ebb and flow of the alluvial plain for thousands of years.

Just when conservationists were ready to tick off the Delta as a lost cause, the winter of 1983-84 brought one of the wettest El Niño seasons on record. The millions of acre-feet of water storage capacity on the Colorado River system was quickly used up, and the U.S. Bureau of reclamation was forced to release some of it to prevent flooding.

"By the early 1980s, the Delta was a forgotten ecosystem, but it's very resilient. You add a little water and it comes back to life," said Francisco Zamora Arroyo, a biologist from the Sonoran Institute. Since 1998, the institute has been working on habitat conservation and restoration projects along the Colorado River corridor in Mexico.

Where native cottonwood, willow and mesquite trees had withered away and been replaced by nonnative salt cedar, conservationists were surprised to see the natives coming back. It was that season, Arroyo said, that spurred them into action, leading to the extensive programs in place today.

"I think we have set realistic goals in terms of restoration and securing water," he said, pointing out that with the demands currently being placed upon the river's water supply, habitat in the Delta will never be what it once was. With their sights set on enhancing around 80,000 acres of habitat along the Colorado River corridor, everything is dependent upon the amount of water rights they are able to procure. So far, less than a thousand acres have been restored, but Arroyo said that work is progressing steadily.

After a fairly wet decade, enough attention was focused on the Delta to prompt the Mexican government to petition the United Nations Education, Scientific and Cultural Organization to list it as a Biosphere Reserve, a designation it received in 1993.

Unlike its superpower neighbor to the north, Mexico has limited funding available for environmental projects, so the work has fallen largely to nongovernmental organizations on both sides of the border. Two, Tucson-based Sonoran Institute and Mexico City-based Pronatura, partnered in 2002 to adopt a community-oriented approach to restoration projects. A number of other U.S. and Mexican nongovernmental organizations also are involved, as well as research groups from the University of Arizona and Universidad Autonoma de Baja California. By 2005, they had formed the Colorado River Delta Water Trust (see PowerPoint presentation here) in order to buy water rights for habitat restoration projects.

"We have been securing water rights in the Mexicali Valley, and our goal is to get at least 50,000 acre-feet," said Arroyo, adding that the 15 restoration projects they have in operation along the Colorado's irrigation-dictated route all use water fed from the irrigation system. "This is the first year [of operation], and we already have 1,450 acre-feet." The goal is to have enough water to be able to flood and dry out restoration plots to mimic the pulse flows seen in the area when the Colorado River was undammed, although he said that most of the water they get now is inadvertent return flows and seepage.

While the main focus of the Sonoran Institute and Pronatura's efforts are on the Ciénega, Arroyo noted that restoring habitat along the banks of the river helps the Delta as well. "Salt cedar is better than nothing, but the birds prefer the diversity of [native] Delta plants," said Ricardo Olachea, a Pronatura marine biologist. He added that because the Delta is along a main path taken by migratory waterfowl, providing good habitat is important. Conservation scientists tend to address the river corridor as a whole rather than as isolated test sites, said Arroyo, and particularly in a setup like this, where the upstream riverbanks act as a filter for water going into the Delta.

Lacking the funding and mechanization enjoyed by their Bureau of Reclamation counterparts north of the border — with an average annual budget of about $400,000 in comparison with the hundreds of millions the bureau has at its disposal — Arroyo and other project managers in Mexico are employing manual labor from nearby communities.

Although machines finish the work much more quickly, Arroyo said that their method is getting locals engaged in the process.

On a warm winter day this past December, about 20 miles south of Mexicali, Aurelio Alfaro Rodriguez, 32, a former farm worker, toiled in the bright sun, clearing a site of nonnative salt cedar with a machete. Assisted by perhaps half a dozen other people, he was making way for plantings of native cottonwood and mesquite trees along one of the many irrigation-fed oxbows — called *son* in Mexican Spanish — that the institute is using as platforms for restoration.

"I've learned a lot of things since I started working here. I understand it all better now," he said, wiping the sweat from his brow with a dusty hand. Arroyo said he has met people who didn't even know the Colorado River crossed through their communities.

Fostering eco-tourism has also been a major goal of the Sonoran Institute's program, both to generate public interest and funding for restoration efforts and to educate locals and visitors about the area's natural ecology. They have set up eco-camps at the Ciénega — whose marshes are a haven for duck hunters and fishermen — and at several of the riverbank restoration sites.

"Economically, the local people can work in eco-tourism and bird-watching. It will make a healthier area with more birds, trees and fish," Arroyo said. Environmental groups have also gotten involved in turning the Las Arenitas primary wastewater treatment plant pond — located about 45 minutes' drive from Mexicali — into a giant wetland. The reeds along its banks filter leftover contaminants before the water is returned to the Colorado River.

The site is attracting scores of waterfowl, luring in birdwatchers from all over the region and even grabbing the attention of the state government, which has promised Arroyo's team funding for a visitor center and a parking area.

Considering their somewhat limited funding, the coalition of NGOs and academic researchers engaged in habitat conservation and restoration projects on the Mexican side of the border has been largely successful in their efforts.

While survival of trees planted along Rio Hardy — a salty tributary fed by agricultural runoff — have been a little lower, in the Delta and along the main stem of what now makes up the Colorado River, it has been as high as 80 percent. As native cottonwood, willow and mesquite trees begin to flourish, the species that use them as habitat gradually return.

Along with restoring a connection between the Ciénega and the Gulf of California — there is still a sizable stretch of dry, salt-crusted wasteland between the desert oasis and the Gulf — there are a number of hurdles to overcome. Water allocations from north of the border are a complex and ever-changing property, but Arroyo and his colleagues are confident that if they keep chipping away at it, something that works for both man and nature can be created.

http://www.miller-mccune.com/science-environment/just-add-water-colorado-delta-resurrects-10876/?utm_source=Newsletter100&utm_medium=email&utm_content=0316&utm_campaign=newsletters

New Agency Puts Clean Energy on Front Burner

By: David Richardson | March 14, 2010 | 12:00 PM (PDT) |

While Arunava Majumdar says America urgently needs to come up with clean-energy "game changers," until now there hasn't been a systematic approach to develop them.

The job of developing really big clean-energy initiatives is perhaps beyond the capacity of the private sector. Lacking any assurance that radically different new products will be accepted by consumers, the market provides few incentives for companies making money from their current products to take the risk to research radical new energy concepts.

And needless to say, companies that don't have successful products on the market are not likely to have the money to invest in big ideas. Plus, government priorities don't include developing saleable products for market.

However, countries in Europe and Asia are beginning to move ahead in clean-energy technology with the enthusiastic support of governments, and if that trend continues, the United States could see itself falling irrevocably behind.

Arunava Majumdar, the first director of Advanced Research Projects Agency-Energy, is leading a ferocious effort to make sure that doesn't happen. The former University of California, Berkley, professor of mechanical engineering and materials science said he'd like Americans to see ARPA-E as "a beacon of hope," that the United States can reclaim world leadership in clean energy technology, while pointing the way to real solutions to the world's tightening energy predicament.

Last week he led ARPA-E on a big step in that direction by convening the first-ever National Energy Innovation Summit just outside of Washington, D.C.

With climate pressures mounting and the prospect of an additional 2 billion people in emerging economies clamoring for energy within the next few decades, the world will need to find some new means of satisfying demand if it is to avoid tripping the circuit breakers of climate change and conflict.

"Incremental change will not be enough to get us there," Majumdar says.

A Sputnik moment

A 2005 National Academies report, "Rising Above the Gathering Storm," compared the United States' current position in clean-energy technology to the country's position in science in the late 1950s when Sputnik boosted the Soviet Union to the head of the space race. The Soviets consistently beat the United States at the next few milestones, including the first animal, first man and first women in space.

But the United States, of course, raised the bar and became the first to reach the moon.

Behind the scenes, Congress, realizing the national security implications of falling behind in science, established the Defense Advanced Research Projects Agency to ensure the country would not be caught flat-footed again.

DARPA, as it was dubbed, proved an unparalleled success, pioneering research that brought us the Internet, GPS, and, in defense, stealth technology and untold game-changing innovations that we pretty much take for granted today.

The Gathering Storm panel recommended a similar course of action, calling on Congress to establish a new agency to do for energy what DARPA did for defense. In 2007, Congress established ARPA-E; funding came two years later.

Arun Majumdar says ARPA-E replicates DARPA's successful management formula: low, lean, fast and bold. The organizational chart contains only two levels of authority: science-oriented program managers who oversee research projects in their respective disciplines, be they biofuels or batteries. Above them is the agency's director, who in turn reports to the secretary of energy who, presumably, has a direct line to the president.

That streamlining, Majumdar says, gives the agency the flexibility it needs to take bold steps quickly.

"Our goal, our job, as mandated by Congress is to go for the home runs," Majumdar said in an interview with Miller-McCune.com. "And history has told us that in moments such as this, which is a Sputnik-like moment, we need to go for some home runs because incremental things may not get us there.

"So the idea of going for high-risk, high-payoff approaches to energy technology is what we're trying to do."

Majumdar says the idea also is to remain unbiased in seeking solutions and not be tied to any one personal favorite technology.

The important thing, he said, is "to make sure there is payoff. We don't want invest in a technology only because it's high risk and there's no oil. That's the wrong kind of investment. We ask the question: 'If this is successful will it be a game changer?' And if it is, then we look at it seriously."

In April 2009 the agency received its first appropriation of $400 million. It immediately issued a request for proposals targeting technological solutions for energy problems.

Majumdar says the response was unprecedented. Some 3,700 proposals flooded in from Americans hoping to try out their clean energy concepts; the deluge crashed an agency computer system and forced the agency to bring in additional reviewers to sort through the ideas. Reflecting the team spirit of the new enterprise, Energy Secretary Steven Chu, a noted physicist, joined in to help evaluate submissions.

Of the 3,700 concept papers, 334 of the most promising projects were selected as finalists and invited to submit more detailed proposals. And in October 2009, six months after the agency first opened its doors, 37 of America's top-ranked innovative energy research and development projects got the word that they would share in the first $151 million in Innovative Energy grants, averaging $4 million each.

Although Majumdar said the first-round funding decisions were made "before his time," he added, "I am so glad this was not $50,000 to 3,000 people. I think that would have diluted the effort. This is focused on the best ideas."

And in the conference center exhibit hall one could almost feel the energy behind those ideas.

Majumdar said he "felt like a kid in a candy store" while viewing the displays and demonstrations set up by the ARPA-E grant awardees and finalists at last week's Innovative Energy Summit.

But, he noted, it's not the agency's role to pick the technologies that will take off — that's the market's role. Unlike the defense sector, where he said the secretary of defense can go to the Pentagon "and say, 'Thou shall buy,' and they'll have to buy the things that DARPA produces; the energy sector is a more market-driven economy, so one has to be compatible. Whatever we develop, it has to be cost competitive in the market."

But, "That also gives us more options, because there can be many different kinds of buyers."

ARPA-E's mandate requires that every four years the agency's leadership team step down to rotate in fresh thinking and new approaches. He said that should prove to be one of the agency's key strengths.

"We'll always be flexible. The idea is to be nimble, and see where the opportunities are, all around." Majumdar said there are other parts of DOE that "make investments" in longer-term projects, and "ARPA-E will collaborate and coordinate with them very closely."

"But our goal is to invest in those areas which can make a big impact and then move on to other things — to hand over to the private sector, or hand over to other parts of DOE, and go on and do other things."

http://www.miller-mccune.com/science-environment/new-agency-puts-clean-energy-on-front-burner-10852/

U.S. Challenged for High-Tech Global Leadership

By: Tom Price | March 13, 2010 | 05:00 AM (PDT) |

A mixed picture emerges as science organizations examine the U.S. lead in innovation and where that lead is headed.

The United States remains the world's high-tech leader, but other nations are catching up, the National Science Board warned in two recent reports.

Science and engineering research is becoming a global enterprise, as more nations develop research capabilities and international collaborations grow in importance, the board said. U.S. corporations are contributing to the shift by conducting an increasing amount of their research and development abroad.

The board — which advises the president and Congress on science matters — urged the federal government to take several steps to enhance U.S. success in the increasingly competitive international marketplace for high-tech goods and services. "Our nation's future prosperity and security depend on strong and unwavering federal commitment to this goal," the board said in a recent report titled "Globalization of Science and Engineering Research."

The board recommended that:

• The National Science Foundation review its criteria for making grants to ensure that it finances "truly transformative research."

• All federal agencies assess their support of research in light of what other countries are achieving.

• The President's Council on Innovation and Competitiveness takes steps to ensure the U.S. economy benefits from research and development that American companies conduct overseas, and to identify areas in which the United States should strive to be the global R&D leader.

The NSF criteria were revised about a decade ago, said Louis Lanzerotti, chairman of the National Science Board committee that issued the report. "It's really important to re-evaluate whether these criteria are sufficient in this more globalized climate," he explained. Similarly, he said, all federal agencies must assess their research needs "much more globally than has been done in the past."

The recommendations are not "anti-internationalist," Lanzerotti said. But it is reasonable to want Americans to benefit from American companies' research, he said, and to make sure that U.S. scientists can do research that's critical to the national interest.

The cause for concern and need for action are shown in a large number of international trends, the board said in the recently released report and in the 2010 edition of its biannual *Science and Engineering Indicators*, which was published in mid-January. By many measures of scientific and technological achievement, U.S. leadership is eroding as other nations, especially in Asia, rise.

The data tell "a worrisome story," according to Kei Koizumi, assistant director for federal research and development in the U.S. Office of Science and Technology Policy.

The U.S. share of global high-tech exports dropped to 14 percent from 21 percent between 1995 and 2008. China became the world's leading high-tech exporter by more than tripling its share to 20 percent.

U.S. R&D expenditures grew 5 to 6 percent a year from 1996 to 2007, while China's soared 20 percent annually and in India, South Korea and Taiwan expenditures rose 9 to 10 percent.

The fastest rise in completion of graduate level science and engineering degrees is occurring in China, India, South Korea, the Philippines and Thailand. Since 2006, foreign students have earned more than half the science and engineering doctorates awarded by U.S. universities, including two-thirds of engineering doctorates.

Most of these developments don't portray a United States in decline as much as they show the rest of the world on the upswing. Around the globe, "there is widespread recognition of the need to move to a knowledge-intensive economy," the National Science Board reported. "Governments increasingly acknowledge the role of (science and technology) in generating new jobs (and) economic prosperity." Even governments in developing countries "have come to view science and technology as integral to economic growth and development, and they have set out to build more knowledge-intensive economies." Those governments are investing in research, education and scientific facilities, and providing subsidies and tax incentives that encourage private companies to carry out research and development that benefits their nation.

Despite negative trends, U.S. R&D continues to lead the world by a large margin. In 2007, America's $369 billion R&D spending exceeded all of Asia's $338 billion and all of the European Union's $263 billion. The United States spent more than the next four countries — Japan, China, Germany and France — combined.

America's share of all high-tech manufacturing has risen — and it continues to lead the world — even though the U.S. share of exports has declined. That's because the United States consumes so much of its product domestically. The United States makes nearly a third of the world's high-tech goods, compared with the European Union's 25 percent and China's 14 percent. It's the world leader in communications, semiconductors, pharmaceuticals and aerospace. It trails only the EU in scientific instruments and China in computers.

U.S. inventors obtained 81,000 U.S. patents in 2008, more than double Japan's 35,000 and all of Europe's 23,000. America's 49 percent share of those patents dropped from 55 percent in 1995.

U.S. inventors also led in what the report calls “high-value” patents — those that were given protection by the EU and Japan as well as by the United States. The U.S. share of 30 percent was down from 34 percent in 1997.

China obtained just about 1 percent of both kinds of patents. But its scientists have become the second-most-prolific contributors to scholarly journals, another area in which the United States continues to lead the world.

The globalization of science is illustrated by the worldwide growth in many measures of scientific prowess, no matter which countries dominate, the board said. For example, high-tech exports more than tripled to $2.3 trillion worldwide between 1995 and 2008. The estimated number of researchers increased to 5.7 million in 2007 from 4 million in 1995. Global R&D expenditures totaled $1.1 trillion in 2007, up from $525 billion in 1996. Cross-boarder co-authorship also increased from 8 percent of scientific articles published in 1988 to 22 percent in 2007.

Foreign corporations actually invested more in U.S.-based research ($34 billion) in 2006 than U.S. firms invested overseas $28.5 billion. Both more than doubled since 1995.

The growth of science abroad is not necessarily bad for the United States, said Alan Leshner, chief executive officer of the American Association for the Advancement of Science.

“I am very happy about the spread of science around the world,” Leshner said. “If science can benefit the economies of other countries — particularly developing countries — that’s all well and good. The United States benefits because the more scientific enterprises that are going on, the more scientific advances occur, and that’s good for everyone.

http://www.miller-mccune.com/science-environment/u-s-challenged-for-high-tech-global-leadership-10818/

Pragmatism's Gift

By STANLEY FISH

Stanley Fish

"Pragmatic" is a compliment sometimes paid to politicians (Barack Obama's supporters describe him that way), and it is often used as an honorific indicating a person of common sense who knows how to get things done. "Pragmatic" is also related (at least etymologically) to pragmatism, the name of a distinctively American philosophy that emerged in the early decades of the 20th century in the work of William James, John Dewey and C.S. Peirce. Pragmatism may or may not be an ethical program depending on whose version you are reading, but it always emphasizes the resources of historically given institutions and practices and de-emphasizes the role played in our lives by supra-historical essentialisms (God, faith, truth, reason, brute fact, overarching theory) even to the extent sometimes of denying their existence.

Pragmatism takes our hope away and tells us that all we can do is muddle through.

Like any philosophy pragmatism offers answers to the questions the tradition of philosophical inquiry has been asking since its beginning. What is truth? What is real? How are we to act? What is the source of moral and/or epistemological authority? Pragmatism's basic move is to declare that the answers to these questions will not be found by identifying some transcendental universal and then conforming ourselves to its normative demands (like "Be ye perfect").

Rather, we must, and can, make do with the "ordinary aptitudes of human beings (ourselves) viewed within a generously Darwinized ecology, without transcendental, revelatory, or privileged presumptions of any kind." Pragmatism "completely undermines any assurances, empirical or transcendental, that exceed the provisionality of what we may consensually construct (in our own time) as a workable conjecture about the way the world is." I quote from Joseph Margolis's new book "Pragmatism's Advantage," which is, he says, that it is among the "very small number of Western philosophical movements … that … never exceed the natural competence and limitations of mere human being."

Why is that an advantage? Because, Margolis asserts, it avoids having to choose between "the alleged necessity of some ineliminable invariance in thought and/or reality" and some wholesale subjectivism or idealism that claims "that the natural world is itself constituted or constructed by the cognizing mind." On the one hand, no "transcendental faculty" of reason or some other quasi-deity that will guide us infallibly if only we attach ourselves to it (not that there haven't been any candidates for this honored position; there have in fact been many, too many).

On the other hand, no surrender to the "preposterous doctrine" that we just make it all up as we go along. Instead pragmatism, Margolis explains, "favors a constructive (or constructivist) realism … freed from every form of cognitive, rational, and practical privilege … [and] committed to the continuities of animal nature and human culture, confined to the existential and historical contingencies of the human condition, and open in principle to plural, partial, perspectived, provisional, even nonconverging ways of understanding."

Quite a mouthful, but we can make it manageable by asking just what is a "constructive realism"? In the vocabulary pragmatism rejects, "realism" is (among other things) the thesis that (a) the world is independent of us and our thoughts, and (b) therefore our thoughts (or interpretations or calculations) should always be checked against, and evaluated as adequate or inadequate by, that independent and prior world. Pragmatists by and large accept (a), but not (b). They believe with Richard Rorty (a key figure in the revival of pragmatism in the last quarter of the 20th century) that "things in space and time are the effects of causes which do not include mental states" — the world, in short, is "out there" — but they also believe that the knowledge we have (or think we have) of the world is given not by it, but by men and women who are hazarding descriptions within the vocabularies and paradigms (Thomas Kuhn's word) that are in place and in force in their cultures. Those descriptions are judged to be true or false, accurate or inaccurate, according to measures and procedures that currently have epistemic authority, and not according to their fit with the world as it exists independently of any description.

If a philosophy doesn't have a real world payoff, what's the use of it?

While there surely is such a world, our only access to it, Rorty and Margolis say, is through our own efforts to apprehend it. Margolis: "The real world … is not a construction of mind or Mind … but the paradigm of knowledge or science is certainly confined to the discursive powers of the human." Thus the content of realism — of what the best up-to-date accounts of the world tell us — is constructively determined by the workings of a culture-bound process of hypothesis, experiment, test and calculation that is itself a constructed artifact and as such can change even as it guides and assesses research. In the absence of the alternative pragmatism rejects — something called Mind equipped with something called reason which enables it to describe accurately something called the World (Bacon's dream) — "realism cannot fail to be constructivist, though reality is not itself … constructed" (Margolis).

A constructive realism will still make use of words like "true" and "better," but these are judgments that a proposition is or is not warranted — has sufficient evidence backing it up — within the prevailing paradigms. (What higher judgment could here be? Kuhn asks.) In the event of a paradigm change — not an event that can be predicted or planned; it takes the form of conversion not demonstration — there will be new canons of evidence and new measures of warrant. Notice how far this is from saying that "anything goes." At any moment the protocols and procedures in place will enforce a rigor of method and interpretation; it is just that the rigor lives and has its shape entirely within "the existential and historical contingencies of the human situation" and not in a realm of extra-human verification and validation, whether that realm be theological, philosophical or empirical.

The implications of the pragmatist argument are at once far reaching and unthreatening. They are far reaching because, as Margolis points out, "If realism takes a constructivist turn, then all the normative features of the sciences (say truth and validity) must be constructivist as well — as … our moral and political norms would be." These implications are unthreatening because if the pragmatist account is right it is describing what has always been the case. When Margolis announces that there are "no privileged faculties, no preestablished harmony, no exceptionless universals, no assured natural necessities … no escape from the contingencies of whatever we report as 'given' within human experience," he is not ushering in a new age, but describing the necessary condition of all the old ones. It has ever been thus (again, if pragmatism is right), and yet the world's business has always been done.

Often, however, it has been done badly and that explains what Margolis calls "our remarkable appetite for the dictates of reason," for something that would, if we could specify it and hold to it, enable us to avoid error and reduce contingency and provisionality to the point where our actions, both physical and mental, would be truly and firmly grounded. Pragmatism takes that hope away and tells us that all we can do is muddle through, that we have been muddling through for a long time, and that, with luck, we will continue to muddle through, and in the process, perhaps, develop new forms of the "cultural artifact" we are and develop too new forms of knowledge to serve our artefactual purposes. The story so far has been an amazing one, full of wonder and full of horror. It is a story, says Margolis (following Kuhn) driven from behind and not by a teleological end awaiting us in the form either of a union with deity or an ascent to the realm of pure Reason. It is, Margolis tells us, "an extraordinary form of bootstrapping."

Does knowing that we are bootstrapping rather than marching to the tune of some "ineliminable invariance" help us to do it better? Is pragmatism's advantage more than philosophical, in the academic sense? Does it enable those who are persuaded by it to live improved lives? Rorty thought so, thought that pragmatists would be less cruel, more open, more tolerant and inclusive than those who were bound to an essence that called them to acts of exclusionary judgment.

Margolis flirts with the idea that pragmatism confers such benefits of character in a single sentence when he says of our "deep longing" for invariance that is "has siphoned off our energies from the better prospects of what to believe and do under the conditions of practical life." But we hear no more in that line and that's a good thing because the last thing pragmatism should want to do on its way to jettisoning every supra-historical assurance in sight is to offer itself as a superior one.

But if pragmatism doesn't have real a world payoff, if it is of no help when the next crisis comes your way, what's the use of it? Why should anyone be interested in it? Behind these questions is a larger one: why should anyone be interested in philosophy in any of its versions? The usual answer is that philosophy, by identifying first principles, can serve both to guide and justify our actions. When pragmatism tells us that there are no first principles, it not only disqualifies itself as the source of guidance and justification; it disqualifies the whole enterprise, at least in its more ambitious forms. What it leaves are the pleasures of doing philosophy, the pleasures of thinking about thinking freed from the burdensome expectation that we will finally get somewhere. Now there's an advantage and a gift to boot.

http://opinionator.blogs.nytimes.com/2010/03/15/pragmatisms-gift/

Admire Her Body, Hamper Her Brain?

By: Tom Jacobs | March 15, 2010 | 11:00 AM (PDT) |

New research suggests sexual objectification hinders some women's cognitive ability.

Guys, here's something to consider the next time you ogle an attractive woman: Your desirous gaze may be reducing her capacity to think.

That's the startling implication of a research paper titled "My Body or My Mind," recently published in the *European Journal of Social Psychology*. It suggests some women who are objectified by men internalize this perception and think of themselves as "a sexual object to be scrutinized." For reasons that are not entirely clear, this process appears to undermine their cognitive ability.

Psychologists Robin Gay and Emanuele Castano of the New School for Social Research tested this thesis with a clever experiment that mimics and magnifies what many women experience in everyday life. The study participants — 25 women ages 18 to 35 — were told they were recruited to provide information on "the impressions people form about others solely based on their carriage and style of dress."

Each was videotaped for two minutes — first from the front, then from behind — while they walked up and down a hall. To capture the experience of having their bodies evaluated while their faces (which presumably provide a better reflection of their individual personalities) were ignored, they were filmed exclusively from the neck down.

For half the participants, the person doing the filming was male; for the other half, the camera was held by a woman. "Although there is no doubt that women tend to objectify other women, the sexually objectifying gaze is more likely to come from a man," the researchers write.

After the filming, each woman watched her video, reinforcing the experience in her mind. She then filled out questionnaires measuring her levels of Trait Self-Objectification (her overall propensity to view herself through the lens of others) and State Self-Objectification (her tendency to view herself through the lens of others when triggered by a specific event, such as being stared at).

To test their cognitive skills, the women were shown a series of random letters or numbers and instructed to reorder them (putting them in alphabetical order for the letters, in ascending order for the numbers). They completed 21 such tasks, which were presented in increasing order of difficulty.

The results: When women with a tendency toward viewing themselves through the lens of others were placed in a situation where they were objectified (that is, they were videotaped by a man), they made a greater number of mistakes on the cognitive test. They did just as well as other women on the easy initial tasks, but had trouble when the difficulty level went up.

After a follow-up study found anxiety and self-esteem levels were not a factor, the researchers concluded their cognitive difficulties "might be due to a split in perspective regarding the self." (This notion was first described in a 1997 paper by Barbara Fredrickson and Tomi-Ann Roberts.)

A woman in this situation simultaneously sees herself as a unique individual and a generic sexual being. Dividing the psyche in this uncomfortable way "is likely to increase cognitive load, with a resulting decrease in the availability of cognitive resources for the tasks the individual engages in," Gay and Castano write.

They suggest further research would be valuable to discover why some women are prone to self-objectification, while others seem protected against it. Gay and Castano's data suggest about 20 percent of women have a strong propensity toward self-objectification and are thus particularly susceptible to triggers, such as being stared at.

The researchers propose a campaign of awareness and education regarding this phenomenon, which could help women "begin to gain control over, or at least buffer themselves against" its negative cognitive impact. They conclude "it stands to reason that the cumulative effects of objectification on the female body over a lifetime may severely disrupt cognitive processes," at least among this sizable slice of the population.

This is your brain on wolf whistles.

http://www.miller-mccune.com/culture-society/admire-her-body-hamper-her-brain-10780/

Extreme School Makeovers

By: Alexander Russo | March 16, 2010 | 05:00 AM (PDT) |

The 1 in 20 truly wretched schools in America need interventions, but the 'turnaround' effort has yet to prove itself the answer.

Last fall, a teenager on the South Side of Chicago was beaten to death during an after-school melee caught on videotape and spread widely on the Internet.

The violence was the indirect result of a so-called “turnaround” effort, the controversial practice of implementing radical changes to schools that have high dropout rates and low test scores. One neighborhood high school had been closed down, forcing students from two different areas to attend the same school.

In the aftermath, the killing was cited as an example of the kind of disaster that can result. Former Chicago teachers’ union leader Deborah Lynch called turnarounds “the deadliest reform of all.”

Tragedies, community pushback and mixed results haven’t daunted turnaround advocates’ efforts, however. Dramatic efforts to fix broken schools have spread from a handful of big-city school systems into a nationwide priority.

“The policy context, the degree to which the bully pulpit has changed the broader conversation, and the funding levels, have all changed dramatically since last year,” says Jordan Moranus, a partner with NewSchools Venture Fund, an organization that promotes turnarounds.

A turnaround effort is typically described as a vigorous, focused effort to fix a school over a short period of two or three years. It often includes staffing changes, curriculum and schedule changes, and the creation of small schools with some degree of autonomy from the district. Success is usually measured by increases in test scores, graduation rates and lower dropouts.

They're everywhere these days. Six states just signed on to a $75 million turnaround initiative funded by a group of education philanthropies.

More than 40 states recently applied to win $4.3 billion in federal funding under "Race to the Top," a new program that makes turnarounds a top priority. (Nearly the same amount is available to schools for turnarounds alone.)

The California Legislature passed a law in December that would give parents the ability to "trigger" turnaround efforts at failing schools. A similar measure has been introduced in Connecticut. President Obama pledged to turn around broken schools "that steal the future of too many young Americans" during his State of the Union address.

And yet, the questions remain: Are turnarounds a policy fad, a distraction from deeper, broader issues too hard to confront? Do they even work? Even if they do, where are the educators who want to take on this difficult, controversial work?

The overall number of profoundly broken schools is small – an estimated 5,000 schools (or about 5 percent). But they present a far-reaching challenge. They show up at the bottom of district rankings. They generate a disproportionate share of suspensions, expulsions and school safety incidents. Symbols of dysfunction and defeat, they poison public confidence.

The current "get-tough" turnaround movement grows out of big cities. New York City has already closed nearly 100 schools and opened more than 350 small ones as replacements. Chicago has closed roughly 60 schools and created 100 new ones, a program begun under Arne Duncan and continued by his successor after he became the U.S. education secretary.

Of course, efforts to revive lagging schools aren't anything new. (Various school improvement strategies have come and gone over the past two decades, including most recently the approach called "restructuring" that was part of No Child Left Behind, the 2002 federal education law.) Most were too weak to have any real effect, or too drastic and disruptive to be considered viable. A handful has succeeded. The likelihood of success is estimated to be 30 to 50 percent. Some schools have been turned around twice or even three times.

Repeated efforts to "fix" Manual High School in Denver failed to take hold, including one championed by former superintendent (and current Colorado senator) Michael Bennet.

Teachers and community members in Chicago vehemently opposed the proposed takeover of Marshall High School announced this winter, even though you can count the percentage of students passing state exams at Chicago's Marshall High on one hand.

Critics on the left usually point out that turnarounds are disruptive, unfair and ineffective ways to improve schools. They decry turnarounds as a way to blame teachers for districts' inaction, or as a distraction from deeper problems of funding and support for education. They say that turnarounds don't serve enough homeless, bilingual or special-ed students.

Critics on the right argue that fixing broken schools is a fool's errand, uncertain and likely to be ineffective unless it's accompanied by other elements — in particular, making families and students pick schools rather than assigning them by area.

"This isn't just about the adults," says Andy Smarick, a right-leaning education analyst based in Washington, D.C. "It's about the kids, too."

In places like Chicago and New York City, opposition has grown stronger over time. A January story in the *Chicago Tribune* showed that state test scores from newly created elementary schools were no

different than those of long-existing neighborhood schools and that passing rates on state tests in new high schools were even lower than the district average. Some schools there have been improved without drastic measures, according to recent press reports. Others are on their second and third rounds of being fixed. Teachers and community leaders are fighting tooth and nail the proposed closure of two dozen New York City schools.

The size of the challenge and the howls of protest from around the country have already forced some changes in the turnaround juggernaut. Secretary Duncan has recently rolled back his initial goal of revamping 1,000 broken schools each year for the next four years, acknowledging the lack of capacity and interest to go that far that fast. The effort could now reach as few as 600 schools.

The federal rules now include a more moderate turnaround option, the so-called "transformation" model, which requires only the installation of a new principal rather than wholesale changes to the rest of the staff. Other loopholes may allow broken schools to delay changes while they study the problem.

Those tasked with the daunting job have learned some key lessons over the years. Administrators have learned to expect howls of protest no matter how violent or dysfunctional a school may be. (They compare the process to moving a graveyard or merging high schools.)

It's taken more than two years for the dust to settle around the turnaround of Chicago's Orr High School. The nonprofit hired a star principal from Memphis to run things, built new science labs, created an advisory system and brought in parents to help patrol the hallways.

"It's always painful," said David Pickens, Arne Duncan's point person on Chicago turnarounds, in *The New York Times*. "It's like a root canal every year."

Figuring out what to do with kids who've been displaced — busing them to other schools, enrolling them in new schools — is a delicate dance of logistics that turns out to be nearly as important as picking which schools to turn around and hiring new staff.

Other keys seem to be developing a robust school safety plan and focusing on changing the culture of a building rather than academic changes. Deciding what to do with displaced teachers is another issue. Quick test score improvements are important for reasons of politics and public perception.

Finding the right people willing to take on the job is perhaps the biggest problem. Broken schools often attract those who have no other options. Well-established charter networks like KIPP and Achievement First don't appear interested in turnaround work, though a handful of outfits are already involved and a few more will be coming online soon.

In the meantime, the brave, desperate souls doing the actual work are chugging along, pushing and fixing and crossing their fingers that their efforts won't be in vain.

Locke High School in South Central Los Angeles is in its second year of being turned around. Attendance and graduation rates went way up after the first year. The campus was much calmer and more orderly. But test scores weren't dramatically different, and the push is on this year to make sure that the turnaround effort reaches into the classroom."Last year was all about culture," says Cristina De Jesus, the chief academic officer for Green Dot Public Schools, the charter network that runs Locke and a dozen other schools. "This year's all about rigor of instruction."

Locke will get its second batch of test scores back over the summer, and only then will it be clear whether the turnaround was really worth all the effort.

http://www.miller-mccune.com/culture-society/extreme-school-makeovers-10916/

The Rise of Transition Culture

By: Judith D. Schwartz | March 12, 2010 | 05:00 AM (PDT) |

A movement aimed at tackling the energy crisis with aplomb has been stepping on the gas since its formation.

You may or may not have heard of the Transition movement — described by its founder, Rob Hopkins, as "an exercise in engaged optimism"— yet Transition's ideas are informing and even guiding the conversation of how communities confront the twin crises of peak oil and climate change.

The movement is driven by one simple idea: Rather than hand-wringing and lamenting dwindling energy reserves and climate change, Transition wants people to envision and create models for that future — and find much to be cheerful about.

A variety of activities take place under the Transition banner. Scroll around — the movement has had a strong Web presence from the start — and you'll find numerous farm and food events, tree-planting get-togethers, launching a local currency, campaigns to install Smart Meters (through British Gas' Green Streets Energy Challenge), and a program in which teenagers interview elderly people to learn about daily life before the era of cheap oil.

"Transition is often seen as an environmental movement, but ultimately it's about cultural change: enabling the shift from what's appropriate for the upward net energy curve to what's appropriate for the downward curve," says Hopkins, who had been a teacher of permaculture — a holistic design system rooted in ecology — the principles of which underlie Transition.

"[The Transition movement] has become part of the part of the cultural scene, especially in places like Vermont, Oregon and Northern California," says author and environmentalist Bill McKibben. "When he started this, Rob really understood that people needed to take their worries about the climate and do something practical."

What began five years ago as a student project on lowering energy use in Kinsale, Ireland, has grown to 273 "official" initiatives in 15 countries, not to mention the thousands of "mullers" (as in thinking about it). The United States now has 55 active Transition initiatives, the latest in San Francisco.

And while many Transition groups are in predominantly liberal areas, others have set up in more conservative areas, such as Houston and Louisville in the United States, as well as in working-class areas like Brixton and Penwith in the United Kingdom. In Penwith, residents' memory of poverty and knowing that they were last on the supply chain made them receptive to Transition.

The movement remains low profile and unsung. One reason may be that it's so hard to characterize: Transition is at once local and global, high-tech and down-home, methodical and freewheeling. Awareness of the movement has also been confounded by its original designation of "Transition Town movement," since a Transition community might be an island (as in Waiheke in New Zealand), city (Los Angeles) or city district (London's Brixton and Belsize Park). It is now simply referred to as "Transition," and a Transition group is called an "initiative."

What follows is a lexicon of Transition terms, which will help explain the movement and where these ideas come from.

Transition: In Hopkins' words, "Transition" represents "the process of moving from a state of high fossil-fuel dependency and high vulnerability to a state of low fossil-fuel dependency and resilience." Transition "is not the goal itself — it's the journey," he says. Specifically, it's seeing this journey as an opportunity to embrace rather than a calamity to approach with dread.

"Transition" is predicated on the assumption that society cannot keep consuming energy and other resources at our current pace and that we're better off accepting this reality and choosing how to adapt rather than letting ourselves get backed into a crisis. The idea is that the adaptation process can harness creative and even joyful possibilities that until now have laid dormant in our towns and cities. As Hopkins has been known to say, "It's more like a party than a protest march."

Resilience: A community's ability to adapt and respond to changes, as well as to withstand shocks to the system, such as disruptions in food or energy supply chains. Resilience differs from "sustainability" in that the emphasis is on community survival as opposed to maintaining the structures and behavioral patterns that currently exist.

"Resilience is the new sustainability," says Michael Brownlee, a member of the Transition U.S. board and co-founder of Transition Boulder County, the first Transition Initiative in North America. "It's been co-opted by almost everybody. Everybody is sustainable these days."

Marketing aside, Hopkins says the two are intertwined: "Sustainability only works if it has resilience embedded in it."

Energy Descent: The directional change from being on the energy upslope — designing our lives according to the wide availability of cheap energy — to making the most with less. When an individual shifts to lower energy use, this is known as "powering down." Central to Transition is uniting a community around developing and implementing an "energy descent action plan," or EDAP, sometimes described as a 20-year "Plan B" for keeping a place functioning and even thriving on a low-fuel diet.

As with all Transition efforts, each EDAP — to date only been a few have been fully developed — reflects the circumstances and flavor of the community it is to serve. Hopkins notes that Transition Town Totnes, the South Devon market town where he lives, will shortly be publishing its EDAP, which he hopes will serve as a template for others.

Unleashing: A community breaking free from its dependence on fossil fuels. A "Great Unleashing," which takes place when an initiative has the momentum and organization to implement the EDAP, is a big "coming out" party that announces the group's strategy, commitment and enthusiasm to the broader world.

The Great Unleashing for Idaho's Transition Sandpoint Initiative in November 2008 drew more than 500 people to the Panida Theater for talks — including one by Mayor Gretchen Heller — music and dance. "The event is designed to be seen historically as the point at which the process began," says Hopkins. "It's a celebration of local culture. It's an event that the next generation will commemorate by putting up a plaque."

Reskilling: Reclaiming skills that previous generations took for granted but most of us have let fall by the wayside. "The Great Reskilling" refers to the community-wide mastering of skills that will facilitate the process of "powering down."

For many, this is the entry point. Someone may attend a workshop in, say, sock-darning (now something of a fad in the United Kingdom) or mushroom identification, and begin to question aspects of a throwaway, shrink-wrapped culture. "People have an intuitive understanding that we're much more vulnerable than our forebears," says McKibben. "Today we're so specialized, in that people tend to do one thing well enough to earn money and depend on the larger system to do the rest. People enjoy the feeling of becoming more competent in things."

The range of reskilling events is vast: coppice forestry, heat masonry, beehive building, intro to beer brewing, 16-brick rocket stoves, nut drinks and butters (kid approved, of course), lye soap-making, making cheese with raw goat's milk, essential oils for cleaning and healing, "pizza" (circular) weaving, using rain barrels, making your own wooden knitting needles — and these come solely from those posted for my home state of Vermont.

Will Transition culture continue its rise? Will the movement play a role in how people and communities greet the confluence of challenges looming before us?

McKibben thinks it's likely. "Many people [involved in Transition] are willing to become politically involved," he says. "In the 350 event — the largest day of mass political action the world has seen — Transition Town people played a large role."

He notes that while Transition initiatives focus on the local – creating food, energy and economic resilience on a community basis — the connection between global and local is not lost: "No matter how great your organic garden is, it still has to rain sometimes."

http://www.miller-mccune.com/science-environment/lexicon-of-change-the-rise-of-transition-culture-10763/

Dogs Offer Clues to Self-Control

By: Tom Jacobs | March 16, 2010 | 10:45 AM (PDT) |

Experiments on canines suggest self-control, in both humans and animals, is related to blood glucose levels.

"Why can't you exercise self-control?" That disdainful question has been posed repeatedly to procrastinators, overeaters and others who find it hard to resist self-destructive impulses. It has rarely, if ever, been asked of dogs.

But according to newly published research, the same mechanism that regulates human self-control also operates in canines.

The study, in the journal *Psychological Science*, confirms the notion that self-control is a limited resource, one that can and does get depleted. It also suggests this is not "a uniquely human process."

A University of Kentucky research team led by psychologist Holly Miller conducted two experiments with groups of canines, observing how much persistence they exhibited when given a task. The first experiment featured 13 dogs (two Belgian Tervurens, four Australian shepherds, a Hungarian Vizsla and four mutts) who had been trained to sit and stay at their owners' command.

The dogs were separated into pairs based on their training history. One from each pair was cued to sit and stay by its owner for a total of 10 minutes, with the command being repeated as necessary. The other was simply kept in a quiet room for that same amount of time.

Afterward, each dog was given a Tug-a-Jug toy, a clear cylinder containing treats that can be accessed via a hole at one end — if the dog manipulates it properly. Each toy contained a small wooden block and half a wiener, which the dogs very much wanted to get at. Alas, they were unobtainable, being too large to fit through the hole.

The dogs that had exercised self-control by sitting in place for 10 minutes gave up and discarded the toy more quickly than the others. They "appeared to have depleted some important resource, which led to decreased persistence on the unsolvable task," the researchers write.

Interesting, in a Samuel Beckett meets Animal Planet sort of way, but can this canine behavior really be equated with the human willpower? In a follow-up interview, Miller noted that a human exercises self-control when he or she ignores temptations and distractions, and completes a project, be it filing a report or taking out the trash.

"In the case of the dogs, they too were trained to work on a project (the Tug-A-Jug toy)," she notes. "And when the project became difficult and non-rewarding, they faced a trade-off: Should they persist on the difficult project in order to obtain the reward? Or should they give up trying?

"The dogs that were depleted were unwilling to persist for long with their goal-directed behavior, but the dogs that were not depleted were able to persist longer."

A second experiment, on 22 dogs of various breeds, repeated the first with an additional component: Half the dogs in each condition were given a glucose drink prior to grappling with the toy, and half were given a sugar-free beverage. Previous research has linked self-control in humans to blood glucose levels.

"Dogs given a glucose drink persisted in interacting with the toy whether or not they had had to exert self-control prior to the test," the researchers report, adding the glucose apparently replenished the animal's capacity to keep at the task.

Miller appreciates the irony in this finding, which suggests the way to replenish one's self-control (say, to resist junk food) is to drink a sugary beverage. But she hastened to add she's not recommending a trip to the soda aisle of 7-Eleven.

"All carbohydrates, once digested, are converted into glucose," she said. "Some carbohydrates are digested quickly and have immediate effects (e.g. a glucose drink). Some are digested more slowly and have a longer lasting effect (e.g. apples).

"If I were translating this into the recipe for a good weight-loss intervention, I would advise people to eat when they are hungry and always choose foods that are low on the glycemic index. These foods will provide the brain with energy for longer durations of time and thus fuel the ability to inhibit eating unhealthy foods."

So these experiments on dogs contain an interesting implication for humans: Willpower — presumably a foreign concept to canines – isn't so much a question of character as it is one of biology.

"People can control their own behavior," Miller said. "When they fail, it is not because they are terrible or weak; it is because they are depleted.

"They need to evaluate what they are eating in order to determine if they are eating wholesome food at regular intervals. And if they want better self-control, they can build it. They can encourage their bodies to store more self-control fuel via exercise."

So, to conserve the fuel crucial to making smart choices, go out for a run. Better yet, take your dog.

http://www.miller-mccune.com/health/dogs-offer-clues-to-self-control-10928/

Can You Alter Your Memory?

Doctors Try New Therapy for Phobias; Taking the Sting Out Of Childhood Upsets

By SHIRLEY S. WANG

Is it possible to permanently change your memories? A group of scientists thinks so. And their new techniques for altering memories are raising possibilities of one day treating people who suffer from phobias, post-traumatic stress disorder and other anxiety-related conditions.

Douglas Jones

Some researchers are working with combat veterans, car-accident survivors and rape victims to replace their memories with less fear-filled ones using a familiar hypertension drug. Other scientists are studying whether behavioral therapy can one day be used to modify memories of people who react with fear to common anxiety-producing events. A person bitten by a dog as a child, for instance, might be able to overcome a canine phobia if the old memory can be replaced with a less scary one.

Memory Therapy

1. Bad Experience

A disturbing memory is created, such as a dog bite you received as a child. When the memory leads to an outsize fear, a phobia can develop that continues to face you as an adult.

2. Recall

The therapy begins by taking the memory out of storage in your brain and revisiting the emotions you felt originally, which often involve fear or distress.

3. Modify

A doctor exposes the patient to whatever triggers fear (pictures of dogs, for example). The patient is trained to react to the memory differently, sometimes with medication or through behavioral therapy.

4. Store

The patient saves the modified memory into storage in the brain. The therapy can be repeated to cement the result. Studies have shown that some patients remain less fearful a year after treatment.

The goal of the research isn't to erase memory outright, as depicted in popular movies over the years. That would raise ethical issues and questions of what would happen to associated memories, scientists say. Instead, "reducing or eliminating the fear accompanying the memory...that would be the ideal scenario," says Roger Pitman, a psychiatry professor at Harvard Medical School who has done extensive work in this area.

The latest research is based on a radical rethinking of how memories are stored in the brain. Scientists used to believe memories are like snapshots on which the details are fixed once they are recorded. Now, many experts accept the view that memories are stored like individual files on a shelf; each time they are pulled down for viewing, they can be altered before being put back into storage. Altering a memory during the time it is off the shelf can create an updated memory that can be saved in place of the old one, scientists believe.

Sometimes a traumatic incident can trigger an enduring response of fear whenever the incident is recalled, even indirectly. A car backfiring, for instance, can set off an emotional response in a combat veteran if the loud noise becomes associated in his mind with a wartime experience.

A common therapy currently for trauma and phobias is called exposure treatment. It involves repetitive exposure in a nonthreatening way to help patients confront their fears and gradually weaken the fear response, a process known as extinction. But with extinction, the fearful memories don't disappear or get altered, and relapse is common, says Edna Foa, an expert on post-traumatic stress disorder at the University of Pennsylvania School of Medicine. If extinction could be enhanced, that could mean more efficient treatment with less relapse, she says.

Researchers are hoping new techniques will weaken the fear response for a longer period, or perhaps permanently. The trick, they say, is to administer the treatment after the original memory has been retrieved from storage so the updated memory will be saved. One way of doing this is to have the subject write a detailed account of the original incident and reread it at the start of each treatment session.

In a recent study, Harvard's Dr. Pitman and Alain Brunet, a psychiatry professor at McGill University, treated a Montreal man who had developed symptoms of post-traumatic stress disorder after being hit on the head with the butt of a gun and fearing for his life during a bank holdup. The man gave up his long-time hobby of bird watching and broke up with his romantic partner. And he became house bound, because he felt unsafe whenever he went outside, Dr. Brunet says.

The man received six treatment sessions, Dr. Brunet says. At each session, he would revisit the original memory after being given the drug propranolol, a hypertension medication that reduces common symptoms of fear, which include a speeded-up heart rate and excessive sweating. By the fifth treatment, Dr. Brunet says, the man said he felt remote when reading the script he had written. Now, two years after the treatment, the man has resumed his normal activities and says that although he remembers the events at the bank, he doesn't feel scared anymore, Dr. Brunet says.

Dr. Brunet is currently enrolling patients for a new study in which participants with traumatic memories will randomly be assigned to receive propranolol or a placebo. Dr. Brunet previously performed two small studies with Dr. Pitman, one published in the Journal of Psychiatric Research in 2008 and the other awaiting publication, that showed PTSD symptoms were reduced in subjects who received propranolol after evoking memories of their past traumatic events. "They felt less symptomatic, less emotional about the memory," Dr. Brunet says.

Another research effort also aims to alter traumatic memories, but with the use of behavioral therapy instead of drugs. Elizabeth Phelps, a psychology professor at New York University, worked with colleagues at the University of Texas at Austin, to use a laboratory experiment to induce fear in 65 study participants. The results were published in the journal Nature in January.

Do You Remember These?

Sigmund Freud theorized in the 1890s that people repress hurtful memories, only to have them return in later years. Altering memory has been a recurring theme in popular culture, including in these films.

Each person was hooked up to a machine that would administer a mild but unpleasant electrical shock at certain times. Participants sat in front of computer screens where they looked at shapes of various colors. Whenever the blue square popped up, the machine shocked the participant. Soon the participants learned to "fear" that image; when they saw it on the screen, they would sweat more, as measured by a common gauge.

The next day, all participants underwent exposure treatment in the lab, to unlearn their fear. This time, when they looked at blue squares on their computers, they received no shock. For one group of participants, however, the researchers created a window of opportunity to administer the therapy after retrieving the original memory. Ten minutes before the fear-extinction session, the group was "reminded" of the previous day's experience by being shocked once more, which activated the fear memory from storage and made it available for possible alteration. The rest of the participants received the fear-extinction training outside of the time period in which the memory is thought to be modifiable.

On the third day of the experiment, participants were tested to see how they responded to the fearful memory. Only the group that had received the retraining during the memory-retrieval period didn't relapse. These participants showed no physiological indication that they remembered that seeing the blue square meant they would be shocked. This memory modification was still intact up to one year later.

Dr. Phelps says more work needs to be done to know if the process can work in real-life situations with complex memories. "Going from blue squares to PTSD is a big leap," she says. She also says the technique could have uses beyond treating traumatic memories, perhaps to treat obsessive-compulsive disorder.

Or, the treatment could be used to affect the mind's ability to enhance happy memories, which can make them seem even more pleasurable than the original event. Dr. Brunet says that might be useful in helping some people quit smoking. Smokers often feel happiness when thinking back to good times involving smoking, which makes them want to smoke again, he says. If the good feelings could be dampened, smokers may feel a reduced urge to light up, he says.

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http://online.wsj.com/article/SB10001424052748703447104575118021991832154.html?mod=WSJ_LifeStyle_LeadStoryNA

Free Higher Education Is What the People Want | From the Bell Tower

But can it actually work?

Steven Bell, Associate University Librarian, Temple University, Philadelphia, PA -- Library Journal, 3/18/2010

Free, according to Chris Anderson, is the new model for how business will work in the future.

Could free, as in absolutely no cost to the student, ever work for higher education? No one knows for sure, but at least one innovator is a believer. Shai Reshef, an Israeli entrepreneur, is the founder of the University of the People (UotP), the world's first global, tuition-free online university.

There are countries where higher education is free to the students and their families, but not really. Taxes far higher than our own, such as those added to gasoline (as in the Scandinavian countries) or other essentials are what really fund the salaries and materials required to support colleges and universities. Reshef's institution really is free because, in essence, all the resources are provided free by their creators. The courses, the technology infrastructure, the registration process, virtually everything it takes to deliver higher education, is free. But will it work?

A year later

When I first learned about the UotP I had to admit being skeptical. Those of us who work in higher education know how expensive it is to produce learning and scholarship. If the academic world is profoundly challenged to create a sustainable free, open access scholarly publishing system—which everyone acknowledges must be financially supported by someone or some organization somewhere along the knowledge production chain—then how can we possibly devise a working system of free higher education?

Talk about a wicked problem. It is an overwhelming and perhaps impossible task to be sure, but perhaps that is what drives Reshef to conquer it. Why bother? To bring higher education to the people of the world whose own countries either have no higher education system or one that is in utter shambles.

Now that the first year of operation for the University of the People is coming to a close, what are the future prospects for this incredible venture?

Gaining traction

To date the UotP has admitted 380 from 50 countries out of nearly 3000 that applied. How does it work? According to an article from Inside Higher Ed, "The University of the People relies on free syllabuses and learning materials from open courseware projects from institutions such as the Massachusetts Institute of Technology. It currently offers only two programs, business administration and computer science, and employs only five paid instructors. Those instructors administer courses designed by a corps of faculty volunteers numbering about 800, by Reshef's count. Those professors put together courses using open courseware."

A small amount of revenue is earned in the form of nominal student fees for exams and admissions. According to Reshef it will take nearly 15,000 students to make UotP viable.

One other small thing would help to make UotP a viable institution of higher education: actual degrees. As described in this article from *BusinessWeek*, while it does have students on track to earn two and four-year degrees in the two existing programs, "no degrees will be granted until the university obtains proper authorization from relevant authorities…. Obtaining accreditation is a top priority for the school, says Reshef, noting that the school is incorporated in Pasadena, Calif., making it easier for the school to work with American accreditation agencies."

Where are academic libraries in the free equation?
For-profit, online higher education firms have already proven that a brick & mortar library is no longer a necessity, even to achieve accreditation. As long as the institution can demonstrate it offers students access to some sort of commercial information resources, possibly with toll-free help from a virtual librarian, it's sufficient for the accreditors. It's widely accepted that online learners just tap the Internet or local libraries when they need to complete a research paper. That's exactly what the creators of the UotP must be counting on when it comes to library services.

It's hard to imagine any institution calling itself a school—especially one of higher learning—when it has not even one physical book to offer its students. But we find ourselves in a boldly different world of learning, where books and libraries no longer carry the symbolic weight they once did. The absence of traditional libraries and learning materials from free universities will hardly slow down the growth of the UotP and other experiments in free higher education.

Supporting a worthy cause
Given that UotP promotes and delivers higher education to those who have no other options, there are distinct parallels with the open access and open education movements—both efforts to provide educational materials to those who otherwise have little chance to access them. This is an institution that will never have a budget for expensive books and journals and profession librarians to manage them. Perhaps those of us who already have these resources should examine ways in which we can use them to support the students at UotP. For example, we could allow students from UotP to receive a higher level of support through our virtual reference services. Our interlibrary loan networks could award the UotP's of the world via some sort of "partner" status allowing its students to receive free article delivery.

Its impact on the market of traditional providers of higher education is infinitesimally minute, so UotP presents no threat—today. But free higher education is a powerful idea, and would be irresistible to many. The question is whether free higher education is an idea that actually works. With just one year at this scale, it is too soon to tell.

Steven Bell is Associate University Librarian, Temple University, Philadelphia, PA. For more from Steven visit his blogs, Kept-Up Academic Librarian, ACRLog and Designing Better Libraries or visit his web site.

http://www.libraryjournal.com/article/CA6723299.html?nid=2673&source=title&rid=18953123

Curious George Escapes The Nazis

Posted: 19 Mar 2010 12:06 AM PDT

Original Artwork Of "Fifi" AKA "Curious George," by H.A. Rey, Circa 1939.
(All images courtesy of the de Grummond Children's Literature Collection.)

He's the world's most notorious mischievous monkey. A scapegrace simian forever in hot water, desperate for yet another bail-out from his nameless pal, The Man In the Yellow Hat. (Wasn't that guy the hero in a bunch of Sergio Leone's Spaghetti Westerns?) But even rabid readers who have held their breath as Curious George is saved by the skin of his banana in adventure after adventure, remain in the dark when it comes to his greatest escape. Back in 1940, when he was a mere infant, the perpetually peril-prone primate narrowly escaped the Nazi invasion of France. Now thanks to a new exhibit at New York City's Jewish Museum, featuring materials from the de Grummond Children's Literature Collection at the McCain Library and Archives of the University of Southern Mississippi, Curious George's most harrowing--yet least known--tale is in the spotlight.

Curious George's creators were husband and wife team H. A. Rey (1898 - 1977) and Margret Rey (1906 - 1996). In all, the Reys wrote and illustrated over thirty books, most of them for children. Seven of these featured Curious George. Since his first appearance in print in 1941, George has became a global celebrity, appearing under various noms de plume in countries outside of the US: "Peter Pedal" in Denmark, "Nysgjerrige Nils" in Norway, "Nicke Nyfiken" in Sweden, "Hitomane Kozaru" in Japan, "Choni Ha'Sakran" in Israel and "Jorge el Curioso" in Spain and Latin America. In the United Kingdom, George debuted as "Zozo," to avoid offending King George VI. In total, his books have sold 30 million copies and have been translated into 16 languages, including Yiddish, Afrikaans, and Braille. Still few

know the full details of Curious George's early years, which were fraught with peril, and in which the smiling monkey actually saved the day for his creators not once but three times.
George was born in France in the mid-1930's. He started out as a minor character, improbably name "Fifi." Fifi didn't even get title billing, he was just one of the crowd in *Raffy and the 9 Monkeys*, published by Gallimard in France, and Chatto & Windus in Great Britain, in 1939. This first book did have a huge impact on the simian's appearance, however. It is the reason that, unlike other monkeys, he doesn't have a tail. H.A. Rey explained: "the giraffe's long neck and legs plus the tails of all nine monkeys made the drawings look like spaghetti." This should once and for all end speculation that the tailless George is actually a member of the ape family.
Both H.A. Rey (born Hans Augusto Reyersbach) and Margret Rey (born Margarete Elisabeth Waldstein) were German Jews raised in Hamburg. They met in the early 1920's, when H. A. attended a party at her parent's home. He was dating her older sister at the time, and his introduction to Margret was preceded by her sliding down the banister. (Margret's lighthearted personality and childlike gestures served as a model for George. She once remarked:"All my life I spent standing behind Hans at his drawing board. I made all of the movements that George made.") The eight-year age gap between H.A. and Margret meant romance would have to wait a few years.
The two did have much in common. Both were from upper-middle-class families with a strong emphasis on educating their children. Hans studied the classics, learning Latin, Greek, French, and English. He later added Spanish, Portuguese, and Russian to his laundry list of languages. Art was not a part of his studies, but he loved to draw, and frequently sketched zoo animals. (He earned a living for a brief time as a designer and lithographer of circus posters.) Margret studied photography and art at Germany's famed Bauhaus School. She worked as a layout artist in advertising firms and as assistant in photographic studios.
Hyperinflation, combined with political unrest and violence, caused Hans to leave Germany in 1924. He moved to Rio De Janeiro, Brazil, taking a job with his brother-in-law's import-export company. For 12 years he delivered bathtubs and kitchen sinks to isolated areas along the Amazon. Monkeys were ever-present in the jungle, and he began keeping marmosets as pets. In 1935 Margret also moved to Rio, where she looked up her old friend Hans. Dismayed to find Hans was wasting his artistic talent, she convinced him to leave the import-export business.
Together they founded Rio de Janeiro's first advertising agency. The business partnership soon became personal, and Hans and Margret married on August 16, 1935. And in a move that proved critically important, the couple became Brazilian citizens as well. (This is the point at which the Reyersbachs legally became the Reys--it was an easier name for Portuguese speakers to pronounce. Margret also adopted the simplified spelling of her first name, and Hans began to publish under "H.A. Rey.")
The newly married Reys worked in their adopted homeland for the next year. Margret wrote, and H. A. illustrated, stories for Rio's newspapers. They also published work in local magazines, sometimes with Margret's photos alongside her husbands drawings. H.A. also found steady employment with pharmaceutical giant Hoffmann-LaRoche, producing their direct mail ad campaigns. In 1936 the hard-working duo decided to treat themselves to a long overdue honeymoon in Paris.

H.A. and Margret sailed for Europe along with two of their pet marmosets. The tiny monkeys were clad in sweaters hand-knitted by Margret to keep them warm. (Sadly these beloved pets did not survive the journey.) The couple fell in love with The City of Light, and settled down in the famed artsy neighborhood of Montmartre. Here they began their life's work: co-producing children's picture books. The extraordinary quality of their writing and illustrating enabled them to find a French publisher right off the bat. The publisher, Gallimard, preferred that the books be attributed to "H.A. Rey" alone. As Margret remembered, "Our publisher suggested we use my husband's name because the children's book field was so dominated by women. They thought it would sell better. After a time, I thought, 'Why the devil did I do that?'" In fact the collaboration was so tight the co-authors tended to forget who did what: "We worked very closely together, and it was hard to pull the thing apart," Margret later said. (In later years her name appeared alongside her husband's on the title page.)

In late 1939 the Reys began work on a sequel to *Raffy and the 9 Monkeys*, centered around the break-out monkey star, Fifi. He had been the smallest, and most troublesome, of the supporting cast of simians in *Raffy*, so naturally he was the favorite of young readers. The new volume was to be called *Fifi: The Adventures of a Monkey*, and was part of a multi-book contract the Reys had with Gallimard. Luckily for

the soon to be endangered couple, that contract included a significant cash advance.

Adolph Hitler had already begun the Nazi expansion through Europe by the end of 1939. Czechoslovakia and Poland had been invaded and annexed by the Third Reich, and occupations of Denmark, Norway, the Netherlands, and Belgium followed within a few short months. France was at war with Germany, but antisemitism was on the rise even in Paris. In 1939 French authorities were tipped off that the Reys were using their Montmartre home as a clandestine bomb factory. A raid on the grounds turned up numerous drawings and stories concerning the exploits of Fifi, none of which could be linked to manufacturing explosives. The Reys remained free thanks to the little brown monkey who later became Curious George. It was the first time George saved his creators, but not the last.
The Reys began to suspect Paris was becoming dangerous for them, and twice left the city for the quieter French countryside areas of Gers and Normandy. On May 25, 1940 Hitler ordered his troops to resume their advance into Belgium and France. The Reys had seen refugees fleeing Northern France for Paris, and then fleeing Paris for areas near the coastline or the Spanish border. The Jewish couple knew that to survive they must become two more of the millions of displaced persons abandoning France. They packed up a few cherished belongings, including their unpublished manuscripts and drawings, and the remainder of the cash advance from Gallimard. Public transportation was jammed, if it was running at all. And like most Parisians, the Reys didn't own a car. Bicycles were worth their weight in gold, and were being sold at such exorbitant prices they might as well have been made of it. The resourceful H.A. Rey scoured Paris for cast-off spare parts and broken two-wheelers, and hastily cobbled together a couple of makeshift bikes. On June 12, 1940 the Reys left Paris with their vitally important Brazilian passports in hand.
As German planes flew overhead (France fell 10 days later), the Reys traveled by bike, and for a short while by rail, to the Basque region. They slept in abandoned farmhouses and stables along the way. The two were determined to escape France for the relative safety of Spain. At the Spanish border they were detained and accused of being spies, due to their German accents. All that saved them were those Brazilian passports and, again, Curious George. Border Guards examining the Rey's papers found their children's stories, and decided they were quite harmless. Their South American citizenship sealed the deal, and H.A., Margret, and George crossed the border into Spain. They sold their bicycles for ready cash, and continued their great escape by rail.

The Reys traveled through Spain to Portugal. In Lisbon they were able to obtain Brazilian visas, buy tickets on a steamer, and sail back to Rio de Janiero. They had lost everything except their unpublished stories, the remainder of the Gallimard advance, and the clothes on their backs. Once in Rio, they used more of their rapidly dwindling cash to book passage to New York City. H.A. and Marget arrived in the US on October 14, 1940. The Reys had been on the road for four months, never knowing when they might be detained, deported, or arrested. Their intrepid simian companion helped them clear one last hurdle in The Big Apple. H.A. and Margret used their manuscripts to prove their occupations and obtain American visas. It was the third time Curious George had saved the day.
The Reys had no U.S. publisher, but Grace Hogarth of Houghton Mifflin bought four of their manuscripts, including *The Adventures Of Fifi*, within a month of the duo's arrival in New York. She asked for only one change in the manuscript: the name "Fifi" was deemed too precious and feminine for an adventuresome male monkey. Thus was born "Curious George." And the rest is publishing history. The mischief-making monkey became a cottage industry, his image adorning not just a series of books, but toys, games, puzzles, trinkets, clothing, bedding, costumes, party favors, and school supplies. George has been the star of movies, a television series, and even a Broadway-style stage musical. As Margret Rey remarked in an interview: "[Curious George] is the family breadwinner; he has put food on my table for many, many years."
The Rey's dramatic escape from the holocaust, and emigration to the US, is echoed is some of the themes of the Curious George books. The premise of the narrow escape from danger can be seen in the first French book, and in the later books written in New York. Also introduced, the concept of The Man In The Yellow Hat "saving the day" by rescuing George from imminent peril. George has been transplanted from his jungle home to the urban US. He has an insatiable need to experiment with the novelties of his strange new environment: a kite, balloons, a telephone, even a bottle of ether. He plays out the "streets paved with gold" cliches of standard immigrant stories: hitting the headlines in the newspaper, getting a

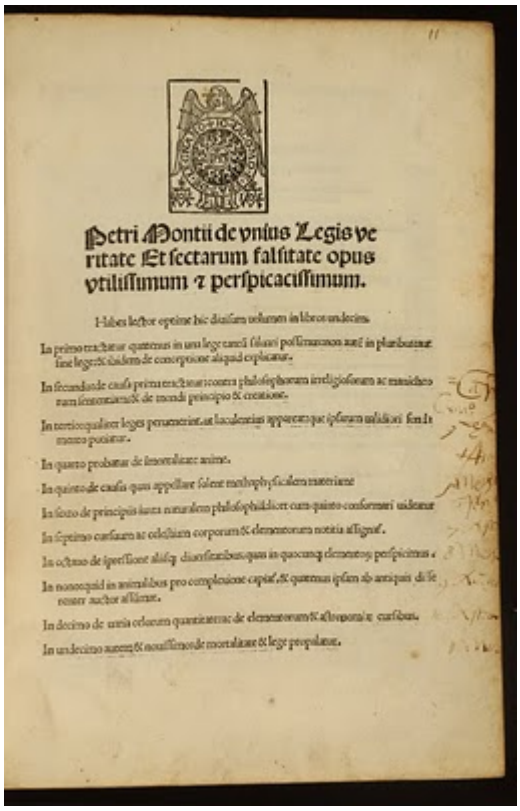
big break in Hollywood, and even being launched into space. The monkey from the African jungle was soon as American as banana cream pie.
The Jewish Museum's exhibit, *Curious George Saves the Day: The Art of Margret and H. A. Rey*, opened March 14 and runs through August 1, 2010. On view are eighty original drawings and watercolors, many never before on display, featuring Curious George and other characters. Pre-publication dummy books and photographs by Marget Rey are also part of the show. The Museum curators are especially pleased to include many archival documents charting the Rey's escape from Nazi Europe, most importantly H. A. Rey's handwritten journals detailing the duo's dangerous dash to democracy. One of the Museum's galleries has been converted into a reading room inspired by our hero's antics in *Curious George Flies a Kite*. A lecture series accompanies the exhibit, including a presentation by Louise Borden, author of The Journey That Saved Curious George: True Wartime Escape of Margret and H.A. Rey (Houghton Mifflin, 2005), an illustrated children's book which tells the Rey's story. Critic, author and historian of children's literature Leonard S. Marcus will explore the Rey's creative life in bohemian post-war Greenwich Village . There are also free workshops for librarians and educators about incorporating the Rey's life story into the study of World War II and the holocaust.

The Jewish Museum's website offers further information, as well as a wonderful interactive timeline for those unable to travel to New York City. The online timeline of the Rey's life in France from the late 1930s through the summer of 1940, includes an audio interview with the couple, illustrations by H. A. Rey, photographs by Margret Rey, contemporaneous photographs, and historic documentary footage. This virtual exhibit is so intriguing it could even keep Curious George out of trouble for a couple of hours.

http://www.bookpatrol.net/2010/03/curious-george-escapes-nazis.html?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+BookPatrol+%28Book+Patrol%29

The Man Who Taught da Vinci How to Play Darts (and Trumped Galileo)

Posted: 19 Mar 2010 12:30 AM PDT


Petri Montii de vnius Legis ve
ritate Et sectarum falsitate opus
vtilissimum ⁊ perspicacissimum.

Titlepage to De unius legis veritate et sectarum falsitate opus utilissimum y perspicacissimum.

The awkward, manic indecision of of a Let's Make A Deal contestant as channeled by George Carlin?

No, just a simple exclamation asserting who wrote about the relative velocity of falling objects first, Galileo or Pietro Monti?

Monti ~~Hall~~ Who?

Warrior, scholar, theologian, and noble, Petrus Montius aka Pietro Monti (c.1457-1530) was a Spanish master at arms living and studying in Northern Italy who wrote volumes on military theory, martial arts, and science and nature, all of which are obscure, quite rare, and have only recently come to light. According to Stanley Anglo, Monti (aka Monte, Monci, Monis) was a friend of Leonardo da Vinci.

"At some time during the years 1497/9, Leonardo da Vinci wrote a little memorandum in one of his notebooks now preserved at the Institut de France in Paris. Evidently he had been puzzling over certain problems concerning the trajectory of javelins, for he sketched what appears to be a technique for hurling spears by means of a sort of sling, and he noted: *'Parla con Pietro Monti di questi tali modi di trarre i dardi'* [Spoke with Pietro Monti of these methods of drawing darts" i.e. javelins] (Richtler, The Literary Works of Leonardo da Vinci, Oxford, 1939, 2d edition, 2 vols., II, p.353], and so we meet the man who taught Leonardo darts" (Anglo, The Antiquaries Journal, Vol. LXIX, 1989, pp. 261-278).

Okay, Da Vinci and Monti walk into a pub, they have a few pints, and play a game of darts. The room clears: These jolly nut-jobs are experimenting with trajectories and, one never knows, they may trajectory a dart right into somebody's renaissance.

Fun with spear-chucking and science as public nuisance is not why we should care about Monti. We should think about him because of a book he wrote, published in 1509.

De unius legis veritate et sectarum falsitate opus utilissimum y perspicacissimum is not a title that trips off the tongue but Of the Whole Law True to Nature and the False Way: A Clear and Useful Work - about as obscure a tome as can be found - contains empirical observations on the relative velocity of falling objects 100 years before Galileo definitively proved Aristotle wrong about the subject.

"An immense encyclopaedia into which Monti has packed pretty well everything he has he has read and pondered concerning theology and science. It is stuffed with an erudition which ranges from Aristotle to Aquinas and Pietro d'Albano - though it must be acknowledged that there is no authority, however exalted, with whom Monti slavishly agrees… [This work contains] an extraordinary sequence of chapters dealing with the velocity of celestial, artificial and animal bodies, in which Monti discusses the relative velocity of falling objects - concluding against Aristotle, but with Galileo, that (whatever their

dimensions) if of the same material, they fall at the same speed. The thing worth noting about this is, of course, that Galileo's treatment of the problem is more than a century later, though it must be conceded that Monti's view is wholly empirical, and that he formulates no mathematical law concerning his observation. Monti also considers the difference between objects moving directly and those which are spinning; and he attempts to compare the speed of crossbow bolts with stones propelled by gunpowder." (Op cit., Anglo).

Aristotle's conclusion that the motion of falling objects was proportional to their weight was initially doubted by John Philoponus (c.490CE-570CE) in the Theory of Impetus within his tome ***In Physics.*** His approach to the problem, however, was through critical thinking and commentary. In the fourteenth century, the "Oxford Calculators" of Merton College addressed the issue from a logico-mathematical vantage point, further eroding Aristotlean physics. In ***La Gnomonica*** (1553), Venetian mathematician Giambattista Benedetti determined through strict calculation that Aristotle was incorrect, eleven years before Galileo was born. His work is known as The Equality of Fall Rates.

In his observations on kinematics, Monti clearly ranks between the Oxford scholars of the fourteenth century and Giambattista Benedetti in the sixteenth century; whether he had a direct influence, however, upon Galileo, who definitively proved Aristotle's theory of kinematics to be wrong through experimental methods, remains unknown. Yet as early testament to its value and utility, the volume under notice was issued in a second edition eleven years later and was quite possibly read by Benedetti. With the reemergence of this tome, Of the Whole Law True to Nature and the False Way: A Clear and Useful Work, within just the last twenty-one years this true Renaissance Man can justifiably take his place amongst the natural scientists of his age, his scientific observations and conclusions based upon his thorough knowledge of military science.

The copy noted by Graesse was in the Crevenna Library. Pietro Antonio Crevenna (1726-1792) was an Italian merchant who lived in Amsterdam; his was one of the most important libraries in the Netherlands. It distinguished itself from other libraries in the eighteenth century through size and structure. It was a library of international renown, containing a rich diversity of the rarest books on all the sciences. Due to financial problems Crevenna was forced to sell the larger part of his library in 1789. Material from the Crevenna collection are the highlights of many important libraries throughout the world. That Crevenna included this volume in his library stands as further testament to its contemporary scientific value.

Only one copy located, at Cambridge (classmark P*.3.32C). No other copies located in OCLC or KVK. Oxford and Yale possess copies of the second edition of 1522. This is a truly scarce book.

By the way, Door #2 contained a wheel of Mother Bocciwhatcha's mozzeroni cheese, an all-expenses paid cruise through the Bermuda Triangle, and a copy of John Carter's ABC For Book Collectors. Stinky cheese, deadly cruise - but a copy of Carter. Such a deal!

"Oh, Monty! Monty! Monty!"

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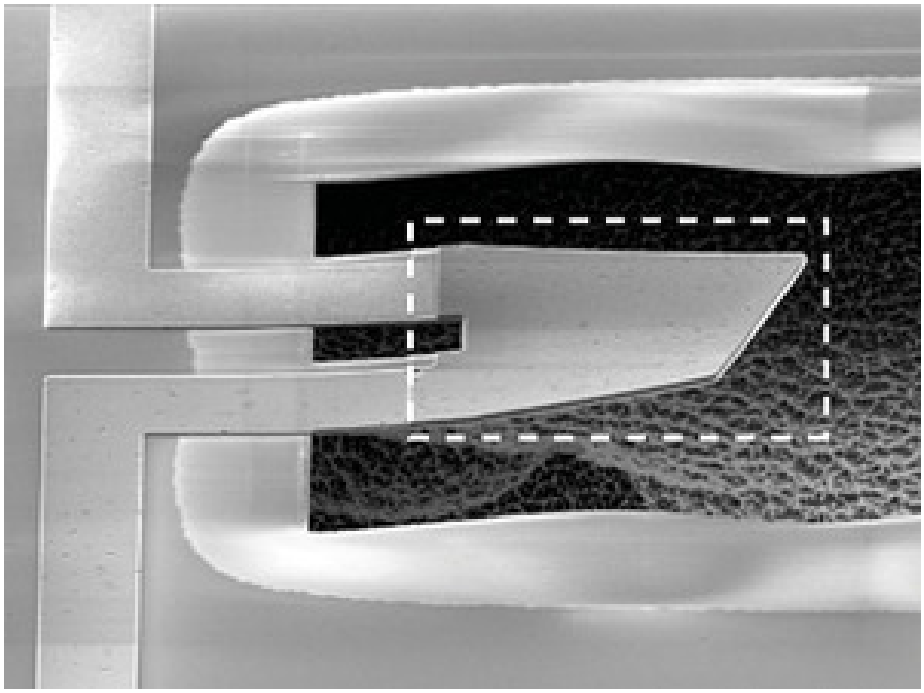
MONTIUS, Petrus. *De unius legis veritate et sectarum falsitate opus utilissimum y perspicacissimum.* Habes lector optime hic divisum vomumen in libros undecim. (Mediolani [Milan]: Jo. Angelum scinzenzelar, impensa Jo. Jacobi & Fratum de Ligano, 1509).

Adams M1721. Paulau 178783. Graesse IV, 593.
http://feedproxy.google.com/~r/BookPatrol/~3/F87WJIvZCnA/man-who-taught-da-vinci-how-to-play.html?utm_source=feedburner&utm_medium=email

Quantum Physics Leaps Into The Visible World

by Joe Palca

March 19, 2010



A magnified view of the tiny hair-thin device, called a resonator, that scientists used to observe quantum mechanics in action. This is the first time that quantum properties have been recorded in anything larger than a bundle of atoms.

Scientists in California have done something astounding. They've shown that physical laws thought only to rule in the mysterious realm of atoms and electrons can also apply to stuff you can actually see.

Isaac Newton was pretty much right on in describing the physical laws of how objects in our world behave. But those laws break down when you get to the world of single atoms. So modern physicists came up with a new set of laws, called quantum mechanics, that does explain how things like atoms behave.

Andrew Cleland of the University of California-Santa Barbara says some of the laws are ... well, the word "weird" comes to mind.

"One of the most striking is quantum mechanics says that an object can be in two places at the same time. Or two configurations at the same time," he says.

Cleland says at first, scientists thought the laws of quantum mechanics applied to objects on the atomic scale. Cleland says it's true — physicists have observed quantum effects in structures as large as 60 atoms. That's large for the atomic world, but totally invisible in our world.

Cleland wanted to see if he could find the size where the laws of quantum broke down and everyday laws take over.

A Structure Extremely Large For The Atomic World

Technically speaking, Cleland and his colleagues used a "microwave-frequency mechanical oscillator coupled to a quantum bit." While true, that's not very informative for most of us. Let's just say that they took something very small.

"The diameter of the structure is about that of a human hair, maybe smaller," he says. But that's extremely large for the atomic world.

They cooled their structure to nearly absolute zero, and to their surprise and delight, the structure they created still behaved in a quantum way — a structure you can see with the naked eye.

So now the question is, how far can you go before the laws of quantum mechanics give way to the more familiar rules of our macroscopic world?

Physicist Markus Aspelmeyer of the University of Vienna says physicists are divided on the question of whether or not there's an upper limit.

"I don't think there will be an upper limit. I think there's something very deep and fundamental about the quantum physical laws," he says.

http://www.npr.org/templates/story/story.php?storyId=124820013&sc=nl&cc=sh-20100320

Ancient Shipwrecks A Wonder Of 'Baltic Triangle'

March 13, 2010

The wheel of an 18th- or 19th-century sailing ship is one of the treasures deep beneath the Baltic waters.
March 13, 2010

A dozen ancient shipwrecks have been discovered in the Baltic Sea, just east of Sweden. The well-preserved ships are hundreds of years old. The oldest wreck may date back 800 years.

"They're preserved as if they were sailing just yesterday," Andreas Olsson tells NPR's Jacki Lyden. Olsson is the head of the archeological unit of the Swedish National Maritime Museum. On some vessels, he says, even the masts are still standing.

At depths of 430 feet and more, the ships are too deep for divers to reach, but robotic submersibles have been taking video and photos. The images show intact hulls and even cargo — such as limestone and wooden barrels.

The medieval ship is more deteriorated, Olsson says, but on younger ships you can see structural details and equipment. "You see the wheels, you see rigging details, doors — everything is still there."

The amazing condition of these wrecks is because of the low salinity of the Baltic Sea, which helps preserve the wood. Plus, the ship worms that eat away at wrecks in other seas can't survive in Baltic waters, Olsson says.

He credits intense shipping traffic along the 30-mile corridor of the Baltic for the large number of wrecks found. "It's bordered by many countries — it's quite a small sea — and we also have the Swedish archipelago, which is difficult to navigate."

With so many shipwrecks in the area, you might call it the "Baltic Triangle."

"It's quite amazing," Olsson says.

There aren't any plans to raise the ships yet. They were discovered by a company scouting the area to lay gas pipe on the sea bed. "The gas pipe can be placed without damaging the ships," Olsson says.

As an archaeologist, Olsson's excitement at the discovery is still high. "I'm still so fascinated. I've seen many shipwrecks," he says, "but each time you see footage of a wreck with all these details from the past, you know, it's really a time capsule that's lying there beneath."

http://www.npr.org/templates/story/story.php?storyId=124637816&sc=nl&cc=sh-20100320

Temporary Hearing Loss May Rewire Kids' Brains
March 15, 2010

By Deborah Franklin

Some kids seem to have near-constant ear infections. Even after the pain is gone, a parent's got to wonder: Are there lasting effects from all that muffling of sound in the formative years?

A child's developing brain needs sound from both ears. (iStockphoto.com)

Research in rats just published in the journal *Neuron* suggests there might be effects in the brain that, while not permanent, can last for years. Apparently, hearing loss in one ear during critical periods of brain development can rewire the auditory cortex, changing the way it processes sound.

Neurobiologist Dan Polley, who recently moved to Harvard and the Massachusetts Eye and Ear Infirmary in Boston, conducted the research with a colleague, Maria Popescu, while at Vanderbilt University.

Polley says that while we don't need two ears to hear sound, figuring out where that twitter of birds or the shout from a friend is coming from requires the sort of depth perception that input from two ears provides. Plus, there are other benefits from a nuanced fusion of the two signals in the brain.

"Our ability to hear speech in a noisy background; to hear the wonderful compliments that your date is paying when you've taken her out to dinner; or when you have multiple people talking to you at once, and you try to home in on one speech source -- all these phenomena depend critically upon integrating signals from each ear," he says.

Polley wondered if the kind of periodic, months-long hearing loss experienced by some children with chronic infections and resulting blockage of the middle ear might actually affect the wiring of the brain. So he and his colleague tried a little test in rats of different ages: In each animal, they blocked the sound in one ear for a couple of months, and then unblocked that ear.

The result: In young rats, the ear that had remained open and clear made a sort of real estate grab in the auditory cortex, developing a much richer network of neural connections. The blocked ear lost influence. And even after both ears were once again sending clear signals to the brain, the imbalance in the brain persisted.

It's the sort of thing, Polley says, that could make triangulating the source of a sound harder, he says, and create subtle, but important deficits in hearing.

"When you don't correctly identify the position of a sound a in space, you may not know it," he says. When you're not able to hear in a noisy background, you may just not go out to dinner as often. You may end up isolating yourself from the environments that really require good hearing."

A child with that sort of problem might withdraw in a noisy classroom, Polley says, or--depending on when the imbalance occurs--might miss milestones in language or learning.Other studies have shown that's just the sort of thing that's been reported among some children with chronic middle ear infections.

Here's some comfort for parents: Though it can take a while, the brain is pretty good at developing workarounds, Polley says. Restore hearing, and the brain will eventually catch up.

http://www.npr.org/blogs/health/2010/03/temporary_hearing_loss_in_kids.html?sc=nl&cc=sh-20100320

Dogs Likely Descended From Middle Eastern Wolf

by Joe Palca

March 18, 2010

Courtesy of Nadav Perez
DNA analysis showed that most dogs share genetic markers with Middle Eastern gray wolves, like this one photographed in Israel.

Modern dogs are descended from wolves, but the question has been: which wolves? Now, scientists at the University of California, Los Angeles say they have the answer. By comparing the DNA from both dogs and wolves, the UCLA researchers say the first place that domesticated dogs called home was somewhere in the Middle East.

Robert Wayne, who led the research team, says he was somewhat surprised by the result. "Previous papers have suggested it was East Asia," he says. But Wayne says those papers focused on a small subset of DNA called mitochondrial DNA, instead of looking across all 2.4 billion letters that make up the dog genome.

To come up with their results, Wayne and his colleagues studied DNA from more than 200 wild gray wolves. "We looked at wolf populations in Europe, the Middle East and East Asia and from China," he says. In each case, they sought out and found genetic markers that were unique to these different wolf populations. So, for example, there were some markers that were only found in Chinese wolves, and others only found in Middle Eastern wolves.

'Dominant Signal Comes From The Middle East'

Then they analyzed DNA from more than 900 dogs from 85 breeds, and looked to see which of the wolf markers dogs most closely resembled. It turns out that most dogs shared markers unique to Middle Eastern wolves, although there were some dog breeds that were closer to other wolf populations.

"Many wolf populations may have contributed to the genomic diversity of dogs, but the dominant signal comes from the Middle East," says Wayne. The new research appears in the journal *Nature.*

"I can't say that I am surprised by the results," says Tamar Dayan, a zoologist at Tel Aviv University in Israel. "I would have been surprised if they were different."

Dayan says dog skeletons 12,000 or 13,000 years old have been found in what is now northern Israel. "They're found in burials with humans in a very clear human context."

This is probably not the final word on the subject of dog domestication. Some scientists think Wayne and his colleagues are barking up the wrong tree, so to speak. But Wayne plans to gather more genetic data that he hopes will fill in any gaps in the history of dog domestication.

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Prostate Test: Lifesaver Or Big Mistake?

by Richard Knox

March 22, 2010
March 22, 2010

Jane Greenhalgh/NPR

The man who discovered PSA — prostate-specific antigen — says most men who get tested for it are thinking about it the wrong way.

"It cannot do what it's been purported to do. It can't detect prostate cancer," says Dr. Richard Ablin of the University of Arizona. "And it's resulted in a public-health disaster."

Can't detect cancer? That's the very reason millions of men and their doctors pay close attention to their PSA number.

It's why a PSA that creeps up from, say, 3.8 to 4.2 causes men sleepless nights — and sends them to the urologist, who will often respond to an "elevated" PSA by sticking a needle into their prostate gland to retrieve tissue samples, looking for cancer cells.

High PSA Not Always A Problem

But wait, Ablin says. Many conditions can cause PSA to go up — prostate infection, the benign enlargement that occurs in most men of a certain age, even sex within 48 hours of a PSA test.

Brad Baugher, director of technology at Oregon Episcopal School, credits a series of PSA tests with helping detect his prostate cancer early.

And when PSA leads to biopsy and biopsy turns up cancer, many if not most of those men will soon find themselves undergoing surgery to remove the prostate, or radiation to kill the cancer.

Most of the time, that's totally unnecessary, Ablin says, because many prostate cancers found this way are so slow-growing they would never have caused a problem.

Think of the prostate gland as an open box, Ablin says. Most prostate cancers are like a turtle that slowly crawls around that box but never gets out.

"We can think of an aggressive cancer as a rabbit that jumps out of the box and spreads," Ablin says. "But we don't know which cancers are turtles and which are rabbits."

Treatment Can Cause Impotence And Incontinence

Many men who get treated for "turtle" cancers end up with lifelong impotence and urinary or fecal incontinence. That's the "disaster" part.

A large European study published a year ago found that for every man whose life is saved by PSA monitoring and early treatment, "there are 48 others who may not have died but had the treatment," says Dr. Craig Redfern of Portland, Ore. "A number of those are impotent, and some of them are incontinent."

It cannot do what it's been purported to do. It can't detect prostate cancer, and it's resulted in a public-health disaster.

- Dr. Richard Ablin

Redfern knows one such patient. "He was about 66, had a 1- to 2-millimeter area of cancer on his pathology. I think he had one core biopsy, which was positive," Redfern said. The pathologist assessed his cancer's aggressiveness as borderline.

"He probably did not need the surgery," he continues. "He's suffering quite a bit from urinary incontinence. He needs to wear a pad. So he's one who has done poorly."

If Redfern had been the man's doctor at the start, he would have counseled him to hold off doing surgery and monitor the situation closely — an approach that some call "active surveillance."

The American Urological Association is pushing "active surveillance" rather than immediately treating every prostate cancer that is found.

But Dr. Michael Phillips, a Washington, D.C., urologist, says it's the unusual man who's comfortable with watching and waiting.

"Even if a man says, 'Well, if I have this low-grade cancer, it might not cause any problems during my natural lifetime, maybe I'll forego surgery,' " Phillips says. "It's hard to lie in bed at night and look at the ceiling and think, 'I have this cancer inside of me.' "

Phillips disagrees with Ablin that PSA blood testing is a disaster. But he says there is a rethinking going on about how to use PSA in a way that does men more good than harm.

More Men Die With Prostate Cancer Than From It

He agrees with Ablin on one big thing: "We're 'curing' a lot of men with prostate cancer who don't need to be cured," Phillips says. "There are probably way too many PSAs being done. And in some areas, there are probably way too many biopsies being done. I've been around long enough to know that you can get burned either way by the PSA — by picking it up too quickly or by missing it altogether and finding cancer too late."

Dr. Craig Redfern, Brad Baugher's doctor and friend since high school, says it's up to every man to decide for himself whether to get tested. Redfern has not had his PSA tested.

In fact, Craig Redfern, the Portland doctor who is a PSA skeptic, cites one case that proves the value of the test — if it's interpreted the right way.

That patient is Brad Baugher, a 55-year-old teacher. Baugher and Redfern met in high school and have been best friends ever since.

Baugher got his first PSA test at age 44, before he was Redfern's patient. When he turned 50, he asked his friend to do a PSA test, just to see if there was any change. The results showed nothing to worry about.

But a few years later, Baugher began having the urinary problems that plague many men beginning in middle age. "I had a few symptoms at night, getting up to go to the bathroom," he says. "My wife was bugging me about going to the doctor, getting my PSA measured, getting checked out. So I did."

PSA Test Can Help Save Some Men's Lives

This time Baugher's PSA was 5.5 — above the 4.0 cutoff that has traditionally been considered a potential marker for cancer but not necessarily a worry.

Still, Redfern says, "since he was my friend and I didn't want any potential conflict of interest over decision-making, I suggested he just see the urologist and decide whether to proceed with the biopsy."

The urologist suggested a course of antibiotics in case Baugher's PSA reflected a minor prostate infection, followed by a repeat PSA. Two months later, that PSA test showed Baugher's level had gone up to 7.2. That triggered a biopsy, which found cancer in four out of five tissue samples.

It saved my life. It may have been a lucky thing, but it was a big deal for me.

- Brad Baugher

A pathologist assessed Baugher's cancer as potentially aggressive, which convinced him to have a radical prostatectomy — surgical removal of the entire prostate gland. Fortunately, that surgery, done in October 2008, has not caused the side effects that men and their doctors dread.

So Baugher is happy he watched his PSA. "I think maybe the test did save my life," he says.

Redfern agrees: "In a couple of years, [the cancer] would have come to light in other ways and probably wouldn't have been curable."

Ablin agrees that Baugher represents the right way to use and interpret PSA — get a baseline test in middle age, check it periodically, don't rush to biopsy or treatment when the PSA level goes up.

But still, the 69-year-old Ablin has never asked his doctor to do a PSA test to screen him for cancer. And neither has Redfern.

"I think the decision in my mind is really whether it's worth it to screen or not," the Portland doctor says. "And my assessment is the burden of harm outweighs the potential benefits, and I don't want to step onto that slippery slope. Every man has to make his own decision."

http://www.npr.org/templates/story/story.php?storyId=124834445

Did Climate Change Drive Human Evolution?

by Christopher Joyce

March 22, 2010

Chip Clark, Jim DiLoreto, & Don Hurlbert/Smithsonian Institution

Five fossilized human skulls show how the shape of the early human face evolved: (left to right) *Australopithecus africanus*, 2.5 million years old; *Homo rudolfensis*, 1.9 million years old; *Homo erectus*, 1 million years old; *Homo heidelbergensis*, 350,000 years old; *Homo sapiens*, 4,800 years old. Scientists believe that climate change had a major impact on the development of early humans.

There's a plan afoot among evolutionary scientists to launch a big new project — to look back in time and find out how climate change over millions of years affected human evolution.

A panel of experts from the National Academy of Sciences in Washington, D.C., has given its blessing to the plan. They say it could unveil a whole new side of human history.

Anthropologist Rick Potts, who heads the human origins department at the Smithsonian Museum of Natural History, has been pushing the idea that "climate made us" for years.

Lately, he's been putting together an exhibit called "What Does It Mean to Be Human?" Among cabinets displaying dozens of skulls of human ancestors, and bronze statues of Neanderthals and other evolutionary experiments, there are displays suggesting the novel idea that climate change influenced how we evolved.

"The explanations that we've had tied human origins back to an African savannah or to a European ice age," Potts says, "and it was never really adequate to understand the plasticity, the versatility of the human species."

Habitats Kept Changing, And So Did The Humans

Darwin's idea was that living things adapt to a place — a habitat.

But Potts says habitats kept changing because climates kept changing. Centuries of drought, for example, would shift to centuries of monsoons, over and over. Which raises a question, Potts says: "Not how did humans become adapted to a specific ancestral environment, but how did we become adaptable?" Extraordinarily adaptable to so many different environments.

"And that's a totally new question," he says, "one that Darwin never really addressed."

Potts is one of the authors of the National Academy of Sciences report, and proposes that it was flip-flopping climate that sparked some of our biggest evolutionary adaptations — the invention of better tools, for example, or a bigger brain. To find out, the science academy developed a plan: get a fuller climate history in places where human ancestors lived — like East Africa. And you can do that by digging into sediments at the bottom of African lakes.

"You can think of it almost like the rings of a tree," says Andrew Cohen at the University of Arizona. He drills into lake bottoms and retrieves tubes of muck. Lake sediments are stacked in those cores like pages in a book. They contain clues to millions of years of climate history, Cohen says — "everything from the fossils of the plant pollen and the organisms that lived in the lakes that respond to climate, to the chemistry of the sediments that also can give us very detailed information about changes in temperature and precipitation."

Scientists can compare these climate timelines to the fossil record of our ancestors to see how climate change affected evolution, but they'll need more bones to do that. Potts says images from satellites or airborne drones could pinpoint where to find them. "The idea of being able to target in on places — hmmm, here's a white spot in Africa that is a place in the satellite image where there is exposure, it's not vegetated, let's go there and let's have a look," he says.

The scientists will also want to look at how climate change affected the animals we evolved with.

Take the case of the Pleistocene extinctions — the extermination of big mammals like mammoths and saber-toothed cats during the last ice age. One popular theory is that rapacious human hunters did them in.

Better Off Than The Musk Oxen

But Tom Gilbert, a geneticist at the University of Copenhagen, says maybe not. Gilbert got DNA from 149 musk oxen — some from as far back as 57,000 years. The musk ox is a big, hairy animal that lived through the Pleistocene extinctions, but just barely.

By studying musk ox DNA, Gilbert could tell where and when their populations waxed and waned. He then looked at where human hunters were.

"We have musk ox in Greenland. When did humans get to Greenland?" says Gilbert. "We have musk ox in Canada, when did humans get to Canada?" The record shows that when man and musk ox met, the herds did not suffer that much. What did kill them off was rapid climate change.

"It does seem with the musk ox, there is this overall matching trend that when the climate is really oscillating up and down, the musk ox seem to be doing very badly, their populations seem to be declining," Gilbert says. So, apparently musk oxen didn't manage climate change so well, and humans have. At least that's the hypothesis that scientists want to test: that repeated climate change made us — those of us it didn't kill first — more adaptable that just about any other creature on the planet.

http://www.npr.org/templates/story/story.php?storyId=124906102

Mind over matter? How your body does your thinking

- 24 March 2010 by **Anil Ananthaswamy**

Magazine issue 2753

Let your body do the thinking (Image: Stephen Simpson/Image Bank)

"I THINK therefore I am," said Descartes. Perhaps he should have added: "I act, therefore I think."

Our ability to think has long been considered central to what makes us human. Now research suggests that our bodies and their relationship with the environment govern even our most abstract thoughts. This includes thinking up random numbers or deciding whether to recount positive or negative experiences.

"Advocates of traditional accounts of cognition would be surprised," says Tobias Loetscher at the University of Melbourne in Parkville, Australia. "They generally consider human reasoning to involve abstract cognitive processes devoid of any connection to body or space."

Until recently, the assumption has been that our bodies contribute only to our most basic interactions with the environment, namely sensory and motor processes. The new results suggest that our bodies are also exploited to produce abstract thought, and that even seemingly inconsequential activities have the power to influence our thinking.

Clues that our bodies may play a role in thought can be found in the metaphors we use to describe situations, such as "I was given the cold shoulder" or "she has an excellent grasp of relativity".

Thirty years ago, such observations led the linguist and philosopher George Lakoff at the University of California, Berkeley, together with philosopher Mark Johnson at the University of Oregon in Eugene, to propose "metaphor theory", the notion that we think of abstract concepts in terms of how our bodies

function. Now evidence for the theory has started to trickle in. In 2008, for example, researchers found that people made to feel socially excluded reported feeling physically colder.

Now, Loetscher and his colleagues have linked our ability to think of random numbers - an example of abstract thought - to bodily movements.

His team asked 12 right-handed men to generate a string of 40 numbers, each between 1 and 30, in as random a sequence as possible. The researchers recorded the vertical and horizontal movements of the men's eyes as they spoke the numbers out loud to the beat of a metronome.

The team found that the eye movements could be used to predict the size of the next number before it was spoken. If a volunteer looked left and downwards, he would typically chose a number that was smaller than the previous number, and if he looked up and to the right, he chose a number that was larger (*Current Biology*, DOI: 10.1016/j.cub.2010.01.015). What's more, the extent to which he looked in a particular direction correlated with the extent to which the number was larger or smaller than the last. The result strongly suggests that abstract thought is tied to the physical movements of our bodies, says Loetscher.

But why would two seemingly unconnected things - apparently inconsequential eye movements and random numbers - be connected? Lakoff, who calls Loetscher's experiment a "particularly beautiful example" of embodied cognition, says it is to do with how our ability to think develops during childhood.

Lakoff reckons that the volunteers are making use of two sets of metaphors for imagining numbers: that up is more and down is less, and that right is more and left is less. Such metaphors would have been learned and hard-wired into the brain at a young age. A child watching a glass of water being filled up, or building blocks piled up, will learn that increasing height means greater quantity, for example. Separate brain regions that process quantity and height could then have been linked up in the growing brain, he says, leading to a hard-wired understanding of the metaphor that up is more. Similarly, right-handed people may learn to link right with more because that hand is dominant for them.

What's not clear from Loetscher's experiment, however, is if eye movements are driving the number selection, or if the number selection triggers particular eye movements.

To probe whether movements can drive thought, Daniel Casasanto of the Max Planck Institute for Psycholinguistics in Nijmegen, the Netherlands, turned to the metaphors that we use to speak of our moods. "We can hardly help mapping them onto a vertical, spatial schema, with the good end 'up' and the bad end 'down'," says Casasanto. "We talk of being high on life, or our mood taking an upswing, or feeling down in the dumps."

We map our moods onto a vertical, spatial schema, with the good end 'up' and the bad end 'down'

His team asked 24 students to move marbles from a box on a higher shelf to one on a lower shelf, or vice-versa, while talking about events that had positive or negative emotional significance - such as a time when they were proud or ashamed of themselves.

As it turns out, the students were significantly faster at retrieving and retelling stories that chimed with the metaphor implied by their actions. So if they were moving marbles upwards, they were faster at retelling stories with positive emotional content than those linked to negative emotions, and vice versa (*Cognition*, DOI: 10.1016/j.cognition.2009.11.002).

The results also led to a deeper question: does physical movement have the power to change not just the speed at which people talk, but also what they choose to talk - or even think - about? Casasanto's next experiment found that it does.

As the students were moving the marbles either up or down, they were asked neutral questions, such as "tell me what happened yesterday". In this task, the subjects were more likely to talk of positive happenings when they were moving marbles upwards, and narrate negative stories when moving marbles downwards. "Isn't that somewhat scary?" Casasanto asks.

They would talk positively when moving marbles upwards, but negatively when moving them down

If bodily motions really are driving our thoughts, Casasanto reasoned that people who use their bodies differently should have different thoughts. To test this, he turned to left-handed people. He asked 286 students, 40 of whom were left-handers, to make judgements about cartoon characters called Fribbles. A page contained 12 pairs of Fribbles and members of each pair looked similar but had distinguishing features. In each pair one member was located to the right and the other to the left of a question.

The questions asked students to circle one of each pair based on their judgement of its personal characteristics, such as honesty, happiness, intelligence and attractiveness. They were either worded positively (which Fribble is the most attractive) or negatively (which Fribble looks less attractive).

The researchers found that 210 students showed a leftward or rightward preference and, of these, 65 per cent of the left-handers attributed positive attributes more often to the Fribbles on the left, while 54 per cent of the right-handers saw positive attributes in Fribbles to the right (*Journal of Experimental Psychology*, DOI: 10.1037/a0015854). "Righties think right is good, and lefties think left is good," Casasanto concludes.

This bias towards ascribing positive virtues to our dominant side may also be reflected in sayings such as "my right-hand man", or "two left feet", which may have arisen because most people are right-handed.

If the inherent characteristics of our bodies are responsible for our abstract thoughts - what does that mean for bodies that are drastically different to our own?Lakoff says that if intelligent aliens exist, they may have very different bodies and therefore have developed very different abstract thought - even perhaps a different mathematical system. "People assume that mathematics is objective and that everybody will have the same math," says Lakoff. "But there is no reason to believe that."

Will thinking machines need bodies?

If our ability for abstract thought is closely tied to our physical selves (see main story), will intelligent machines also need bodies?

It is a question that is being investigated. Roboticist Josh Bongard at the University of Vermont in Burlington says that the physical bodies of robots and the way that they interact with the environment might be key to creating the capability for intelligent, abstract thought. For a start, Cynthia Breazeal at the Massachusetts Institute of Technology and her team has already created anthropomorphic robots that use knowledge of their own bodies to infer the mental states of humans.The development of such robots can also further the study of embodied cognition - the idea that even abstract thoughts are rooted in the physical world, says Bongard. "Robots provide a unique perspective on embodied cognition because we can perturb any part of a robot - its body or its brain - and observe the impact on behaviour. This is something that is usually not possible with animals or people."

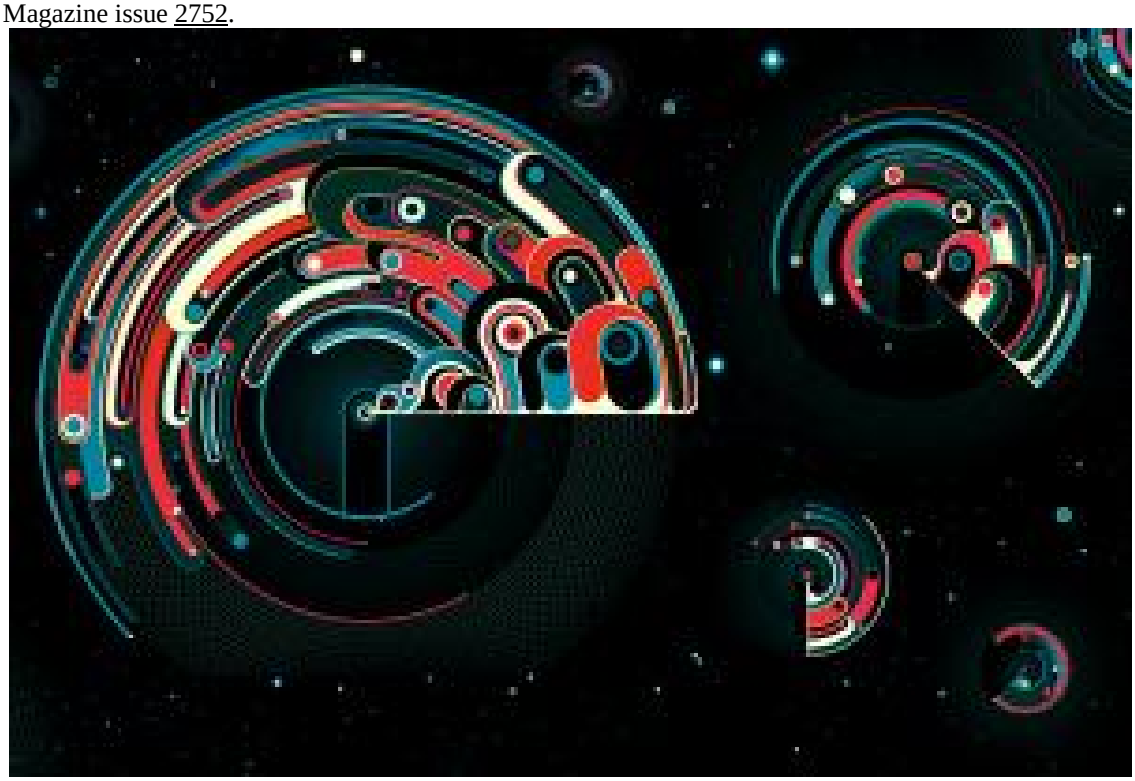
But Kevin Gold of Wellesley College in Massachusetts is more circumspect about whether machines that think will need bodies. He argues that machines endowed with mathematical models of reasoning and abstract thinking - but not bodies - might still be highly intelligent. "It's still an open question whether we need to cleave closely to human cognition to make human-level intelligence," he says.

http://www.newscientist.com/article/mg20527535.100-mind-over-matter-how-your-body-does-your-thinking.html?DCMP=NLC-nletter&nsref=mg20527535.100

Cosmic clocks: Relativity's final test

- 17 March 2010 by **Richard Webb**

Magazine issue 2752.



Pulsars could give away the presence of gravitational waves (Image: Sam Chivers)

Enlarge image

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NIGHT in, night out, the rhythmic radio signals reach Earth. The slowest of them sound like a nail being hammered into wood, or a shoe being slapped against a post to rid it of mud. Others are more like a stuttering motor stopped at a traffic signal. Some make almost continuous tones, ripe to be combined into cosmic mood music.

Always the same signature tunes, always from the same points in the sky. Small wonder that when astronomers first heard them back in the 1960s, some thought they were messages from alien civilisations.

The signals aren't from ET, however; they are from pulsars. These extreme cosmic objects have been keeping us on our toes for over 40 years, and are poised for their greatest coup yet. Meticulous measurements of pulsars' timekeeping might just solve one of the biggest mysteries of modern physics: the whereabouts of gravitational waves.

The keystone of Einstein's general theory of relativity, gravitational waves are tiny ripples in the fabric of space-time. But they have proved frustratingly elusive, despite ever bigger and more expensive instruments being built to detect them. Pulsars could now pip these projects to the post - on a fraction of the budget. "We're already at the stage where we can start to rule out things," says George Hobbs of the

Parkes Observatory in New South Wales, Australia, which is home to one of the pulsar-timing experiments. "We could make a detection next week," he says, depending on the nature of gravitational waves.

It was August 1967 when pulsars first made Earth contact. In a field on the outskirts of Cambridge, UK, graduate student Jocelyn Bell and her supervisor Antony Hewish were using a new antenna array to scan the sky for radio sources. Back then, astronomical observations were measured in miles - of paper. Mechanical pens traced radio signals onto long charts, and it was Bell's job to trawl through them.

In one chart, she spotted an odd bit of "scruff", as she described it: a train of pulses spaced 1.3 seconds apart. It did not fit with any astronomical phenomenon then known, and try as they might Bell and Hewish could find no explanation, natural or artificial. Stumped, they half-joked about who they should tell first that they had eavesdropped on little green men.

Relativity's predictions

By the time they published their findings the following year, the true culprit had been unmasked: a neutron star (*Nature*, vol 217, p 709). These extraordinarily dense bodies, left behind when a star many times the size of our sun explodes in a supernova, pack the mass of our sun and more into a sphere just tens of kilometres across. "It is like taking a sewing thimble and jamming the population of the world into it," says Bell, now Jocelyn Bell Burnell of the University of Oxford.

Besides being unusually dense, neutron stars also rotate rapidly and have huge magnetic fields. To turn a neutron star into a pulsar, its magnetic axis must be at an angle to its rotational axis. That way, the powerful jets of radiation erupting from the star's magnetic poles will sweep round as the star rotates, rather like the beam of a lighthouse. These jets are what regularly buzz our telescopes - although we still don't know exactly how they are formed (see "What makes a pulsar tick?").

The first pulsars to be discovered spin in a comparatively leisurely fashion, taking several seconds to complete one rotation. In 1982, however, a group led by Donald Backer of the University of California, Berkeley, upped the ante with a "millisecond" pulsar that whirls around a breathtaking 642 times a second, fuelled by matter and energy siphoned from a companion star.

The pulses of millisecond pulsars are so fast and regular that they make fantastic cosmic clocks, rivalling the accuracy of any man-made atomic timepiece. From there, it is just a small mental leap to using them to spy out gravitational waves.

According to Einstein's general theory of relativity, mass distorts space and time around it, creating the force we know as gravity. Not even massless light is immune to its embrace. General relativity's most outlandish predictions have been confirmed, including the existence of black holes and the bending of starlight by massive celestial objects. But one remains elusive. If two massive objects are in orbit around each other, relativity says their accelerations will cause transient distortions in space-time that ripple out into the cosmos - gravitational waves.

So far, we have only one piece of circumstantial evidence that such waves exist. It comes, fittingly enough, from a pulsar. In 1974, astronomers Russell Hulse and Joseph Taylor discovered one pulsar circling particularly tightly around a companion, completing one orbit every 8 hours. They saw the distance between the two bodies steadily diminish as they spiral in towards each other - exactly what Einstein had predicted should happen if they were losing energy by radiating gravitational waves.

Similar stellar two-steps have been going on throughout cosmic history, and have played a huge part in building today's universe. According to our best understanding of galaxy formation, small galaxies have collided and merged over time to forge bigger ones. Their central black holes must have merged too, to

form the supermassive black holes present at the centre of most galaxies. As they did so, they should have whisked up the space around them, sending out gravitational waves that still persist today.

Even built up over eons, this rippling of space-time is tiny, and the peak and trough of a complete wave can take years to pass a point in space. Inordinate patience and a super-accurate detector are needed to see anything. The biggest detector built so far is the Laser Interferometer Gravitational-Wave Observatory (LIGO). Spread over two sites in Louisiana and Washington, it aims to nail gravitational waves by measuring changes in the time it takes a laser beam to zap up and down between mirrors set kilometres apart. So far it has seen precisely nothing.

This is where millisecond pulsars come in. Pulsars lie many light years from Earth, leaving plenty of intervening time and space for gravitational waves to gently stretch and compress, so altering the time it takes for their pulses to hit Earth. Theoretically, all you need to see the effect is a single, bright millisecond pulsar that you can time sufficiently accurately for a few years.

In practice, though, this effect is not large enough to be seen even with the brightest and best-timed pulsars. But there is a cunning workaround. As gravitational waves ripple out from their source, they stretch space-time in one direction and squeeze it at 90 degrees to this. Pulsar pulses reaching Earth that pass through a stretched area arrive unusually far apart, and those that pass through a squeezed area arrive closer together (see diagram).

If we map out millisecond pulsars in the sky and time their pulses for long enough to find out the average time it takes them to reach Earth, any variation in that time would indicate interference from gravitational waves. See a pattern of variation in many pulses, all fitting the expected stretch-squeeze template, and you've hit gold.

This is exactly what three projects are now searching for. First out of the starting blocks was the Parkes Pulsar Timing Array at the Parkes Observatory, which started work in 2005. It has been joined by NanoGrav, a North American collaboration that uses the world's most powerful radio telescopes at Arecibo in Puerto Rico and Green Bank in West Virginia. Completing the trio is the European Pulsar Timing Array (EPTA), which combines data from radio telescopes in Germany, the Netherlands, France, the Italian island of Sardinia and the UK.

"To see a gravitational wave signal from supermassive black holes, you need to time twenty millisecond pulsars to 100-nanosecond accuracy with observations every two weeks for five years," says Hobbs. His team at Parkes has been observing pulsars for long enough - unfortunately just not enough of the right kind of pulsar."The lack of good millisecond pulsars has been the biggest problem for all the pulsar-timing arrays," says Scott Ransom, a member of the NanoGrav team based at the National Radio Astronomy Observatory in Charlottesville, Virginia. Until recently, we only knew of about sixty millisecond pulsars in our galactic disc, and not all of them fit the bill for gravitational-wave hunting. Only half a dozen can be timed to 100-nanosecond accuracy, with many more at the 200-nanosecond to microsecond level.

Millisecond finds

Detecting gravitational waves using only these pulsars is still possible; it will just take longer. "More millisecond pulsars will make our detections stronger and come earlier," says Ransom. "We know they're out there, we just haven't found them yet."Our luck is beginning to change, though. In June 2008, NASA launched the Fermi gamma-ray space telescope, a general-purpose telescope to map out sources of high-energy cosmic radiation. In January this year, the Fermi team announced that 17 new millisecond pulsars had popped up in just three months.

It could be the breakthrough pulsar-timing needs. Not all the new pulsars will be suitable - we already know that four are "black widow" pulsars, sucking mass from an unseen companion star. "That can lead

to changes in the pulse arrival times as the radio waves interact with gas from the companion," says Ben Stappers, a member of EPTA. But with a few hundred unidentified Fermi sources still to be examined, a cornucopia of new millisecond pulsars is on the horizon.One characteristic of the Fermi pulsars augurs well: they are pretty evenly spread across the sky, with many visible from the northern hemisphere. Compared with the southern sky, the northern sky has, until now, been a pulsar desert - a situation that astronomers had been attempting to rectify with the first ever all-sky northern hemisphere pulsar search.

Ultimately, however, the best and fastest results can only be achieved by pooling the finest of the pulsars from north and south into one super-array. This is in the pipeline, too, with the three pulsar projects agreeing to share measurements and eventually coordinate observing time across the globe.

So how long will it be before we have a definitive detection of gravitational waves? Hobbs's prediction of next week is, he admits, on the optimistic side. "But with the data we already have, it should be within five years," he says. That puts pulsar-timing in a neck-and-neck race with LIGO, which by 2015 will have undergone a crucial upgrade to increase its sensitivity. "It is all very exciting," says Bell Burnell. "I would say it is about evens at the moment as to whether a pulsar array or LIGO makes the first detection."

And if there is nothing there? Hobbs thinks this is the more interesting outcome. "If we find gravitational waves, everyone gets very excited and Einstein has another feather in his cap - but that's it," he says. If, on the other hand, gravitational waves do not exist, not only will general relativity need some significant revision, but our entire idea of how things came together in the cosmos will need a rethink. "We would have ruled out the whole hierarchical model of galaxy formation," says Hobbs. "We would be back to square one."

If both relativity and gravitational waves don't exist, our entire idea of how things came together in the cosmos will need a rethink Either way, the clocks are now ticking.

What makes a pulsar tick?

We don't know why pulsars tick so regularly. The answer may lie in a paper presented in January to the American Astronomical Society meeting in Washington DC by John Singleton and Andrea Schmidt of the Los Alamos National Laboratory in New Mexico. They suggest the tick might be something akin to the sonic boom produced by supersonic aircraft as they accelerate past the speed of sound (arxiv.org/abs/0908.1349).

Relativity does not forbid the magnetic fields at the surface of a pulsar rotating faster than the speed of light, says Singleton. As they do so, his team suggests, particles of opposite charge are pushed to either side of the pulsar, where they emit radiation. The pattern of radiation is then sharpened by the superluminal boom of the magnetic field into a sharply defined pulse that is emitted into space. A similar effect shapes the sound waves emitted by an aircraft as it accelerates through the sound barrier. While the people inside hear a continuous rushing sound, the sound waves arrive at an observer on the ground as a single "boom" (arxiv.org/abs/0912.0350).

Singleton says his model can reproduce all the features of the radiation given out by a pulsar, replacing the hotchpotch of models needed before. That has got Jocelyn Bell Burnell, who discovered pulsars, interested. "They are explaining some features of pulsar emission that are difficult to explain, and very neatly," she says.Other theorists are less impressed, but Singleton says that is to be expected. "If we're right - and I'm convinced we are - our model replaces 40 years of work that has employed hundreds of theorists. You would expect some hostility."

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http://www.newscientist.com/article/mg20527520.200-cosmic-clocks-relativitys-final-test.html

Neptune may have eaten a planet and stolen its moon

- 22 March 2010 by **David Shiga**, Houston

Magazine issue 2752.

Did Neptune munch a planet and steal its moon? (Image: Jet Propulsion Laboratory / NASA)

NEPTUNE may have polished off a super-Earth that once roamed the outer solar system and stolen its moon to boot. The brutal deed could explain mysterious heat radiating from the icy planet and the odd orbit of its moon Triton.

Neptune's own existence was a puzzle until recently. The dusty cloud that gave birth to the planets probably thinned out further from the sun. With building material so scarce, it is hard to understand how Uranus and Neptune, the two outermost planets, managed to get so big.

But what if they formed closer in? In 2005, a team of scientists proposed that the giant planets shifted positions in an early upheaval (*New Scientist*, 25 November 2006, p 40). In this scenario, Uranus and Neptune formed much closer to the sun and migrated outwards, possibly swapping places in the process.

That would have left behind enough material just beyond their birthplace to form a planet with twice the Earth's mass, according to calculations published in 2008 by Steven Desch of Arizona State University in Tempe.

Neptune's peculiar moon Triton may once have been paired with this hypothetical super-Earth, Desch and colleague Simon Porter now say. Triton is larger than Pluto, and it moves through its orbit in the opposite direction to Neptune's rotation, suggesting that it did not form there but was captured instead.

For Neptune to capture Triton, the moon would have had to slow down drastically. One way to do this is for Triton to have had a partner that carried away most of the pair's kinetic energy after an encounter with Neptune. In 2006 researchers argued that Triton was initially paired with another object of similar size that wound up being gravitationally slung into space after the pair ventured near Neptune (*New Scientist*, 13 May 2006, p 8).

But Triton could have slowed even more if its former partner were a heavy super-Earth. That's because a more massive body could carry away more of the pair's kinetic energy, Desch calculated in a study presented earlier this month at the Lunar and Planetary Science Conference in Houston, Texas. "It would be a lot easier to capture Triton if it were orbiting something bigger," he says.

Neptune may have engulfed the super-Earth. Heat left over from the impact could explain why the planet radiates much more heat than its cousin Uranus, which is similar in mass and composition, Desch says.

But Douglas Hamilton of the University of Maryland, College Park, one of the authors of the 2006 study proposing that Triton had a long-lost twin, points out that smaller bodies would have been common in the early solar system, before planet migration cleared many of them away. Neptune would therefore have had many opportunities to snag Triton from one of these punier objects, rather than from a much rarer super-Earth, so that explanation may still be more likely, he says. Even so, he is not ready to rule out Desch's idea: "It's worth pursuing to see where it will lead."

http://www.newscientist.com/article/mg20527522.900-neptune-may-have-eaten-a-planet-and-stolen-its-moon.html

New ceramic is not afraid of the cold

- 12:33 22 March 2010 by **Colin Barras**

Dunk a hot ceramic into cold water and it will crack as the material contracts too rapidly to hold together – until now. New ceramics have been developed that wrap themselves in a blanket of insulating air to buffer the effects of sudden changes in the temperature of its environment.

Fan Song at the Chinese Academy of Sciences in Beijing and colleagues upgraded a ceramic that was rich in zirconium, silicon and aluminium, and had been tipped for use in high temperatures because of its high melting point. The ceramic's Achilles heel is its resistance to fracturing, however, which plummets by almost 90 per cent when the material experiences sudden changes in temperature, such as being heated above 400 °C and then dunked in room-temperature water.

The researchers made it able to keep its strength even when quenching cooled it by thousands of degrees from temperatures close to its melting point of 3210 °C.

Air blanket

They did this by roughening the surface with plasma etching and concentrated nitric and hydrofluoric acids. The surface ended up covered in nanoscale fin shapes, similar to the nanoscale patterning of a lotus leaf. Like those leaves, the roughened ceramic is strongly hydrophobic, or water repellent.

This is what makes the material resistant to heat shock. It traps pockets of air at its roughened surface, so when cooled suddenly by dunking in water, or if the surrounding air temperature changes, the air pockets act as an insulating layer, buffering the bulk of the ceramic from the rapid change in temperature.

"The high thermal resistance produced by entrapped air is such that the ceramics never exhibit the catastrophic reduction of strength," says Song.

Not too thick or thin

Greg Hilmas, a ceramic engineer at the Missouri University of Science and Technology in Rolla says he is unaware of any ceramic so resistant to heat shock.

But there are questions still to be answered, he adds. "The key regarding the formation of a thin air layer is: how thin is 'thin'?"

Song agrees the question is an important one. "There must be a critical thickness of the surface etched layer," he says, and his team are trying to find out what that is.

Song says the ceramic could replace expensive metal alloys in a range of applications that need thermally resistant high-strength materials, such as those found inside car engines.

Journal reference: *Physical Review Letters*, in press

http://www.newscientist.com/article/dn18685-new-ceramic-is-not-afraid-of-the-cold.html