http://www.eurekalert.org/pub_releases/2011-01/afps-pab012411.php

## People aren't born afraid of spiders and snakes: Fear is quickly learned during infancy

***There's a reason why Hollywood makes movies like Arachnophobia and Snakes on a Plane: Most people are afraid of spiders and snakes.***

A new paper published in Current Directions in Psychological Science, a journal of the Association for Psychological Science, reviews research with infants and toddlers and finds that we aren't born afraid of spiders and snakes, but we can learn these fears very quickly.

One theory about why we fear spiders and snakes is because so many are poisonous; natural selection may have favored people who stayed away from these dangerous critters. Indeed, several studies have found that it's easier for both humans and monkeys to learn to fear evolutionarily threatening things than non-threatening things. For example, research by Arne Ohman at the Karolinska Institute in Sweden, you can teach people to associate an electric shock with either photos of snakes and spiders or photos of flowers and mushrooms—but the effect lasts a lot longer with the snakes and spiders. Similarly, Susan Mineka's research (from Northwestern University) shows that monkeys that are raised in the lab aren't afraid of snakes, but they'll learn to fear snakes much more readily than flowers or rabbits.

The authors of the Current Directions in Psychological Science paper have studied how infants and toddlers react to scary objects. In one set of experiments, they showed infants as young as 7 months old two videos side by side—one of a snake and one of something non-threatening, such as an elephant. At the same time, the researchers played either a fearful voice or a happy voice. The babies spent more time looking at the snake videos when listening to the fearful voices, but showed no signs of fear themselves.

"What we're suggesting is that we have these biases to detect things like snakes and spiders really quickly, and to associate them with things that are yucky or bad, like a fearful voice," says Vanessa LoBue of Rutgers University, who cowrote the paper with David H. Rakison of Carnegie Mellon University and Judy S. DeLoache of the University of Virginia.

In another study, three-year-olds were shown a screen of nine photographs and told to pick out some target item. They identified snakes more quickly than flowers and more quickly than other animals that look similar to snakes, such as frogs and caterpillars. Children who were afraid of snakes were just as fast at picking them out than children who hadn't developed that fear.

"The original research by Ohman and Mineka with monkeys and adults suggested two important things that make snakes and spiders different," LoBue says. "One is that we detect them quickly. The other is that we learn to be afraid of them really quickly." Her research on infants and young children suggests that this is true early in life, too—but not innate, since small children aren't necessarily afraid of snakes and spiders.

http://www.scientificamerican.com/article.cfm?id=reducing-parking-cut-auto-emission

## Reducing Parking Spaces Helps Cities Cut Auto Emissions

***A new study shows economic and policy changes that limit parking have significantly reduced miles driven in 10 European cities***

**By Tiffany Stecker and ClimateWire | Monday, January 24, 2011 | 10**

With bicycle share schemes, smoothly running metros and pedestrian-only streets, Europe has an edge over the New World when it comes to alternatives to automobile transportation. A new study reveals that Europe has success with another tool designed to remove people from their cars: subtracting parking spaces.

Because every vehicle trip must end in a parking space, limiting parking through economic and policy changes has significantly reduced miles driven in 10 European cities, according to "Europe's Parking U-Turn: from Accommodation to Regulation," published by the New York City-based Institute for Transportation and Development Policy (ITDP).

On- and off-street parking is ultimately controlled by municipalities, and decisions at the local level can help boost citizens' adoption of car alternatives. In the cities studied, which range from Antwerp, Belgium, to Zurich, researchers assessed how parking policies have shifted to fit in with "alternative social goals," including walking, bicycling and increasing park and community space.

"European cities demonstrate that if you make a city center more convenient, people won't think that driving is the best and only alternative," said Michael Kodransky, co-author of the study and global research manager with ITDP.

Optimally, parking lots should always be 85 percent full to help reduce cruising for a parking space, said the study. The coordination of on-street parking supply with off-street parking supply through pricing structures is essential.

**Europeans try 'cap and trade' with parking**

Shrinking the number of parking spaces also helps. Hamburg, Germany and Zurich implemented a kind of "cap and trade" of parking spots, where for every off-street spot built, an on-street parking spot was converted into park or community space. Many cities in the study also abolished minimum parking standards for new developments, instead enforcing a maximum allowance. Zoning planners also gave priority access to popular spaces to pedestrians and public transit users.

Paris even invested €15 million ($20 million in physical blocks like bollards to prevent cars from parking. London was the only city in the study to charge parked vehicles based on their level of carbon emissions.

The results are positive. Take Amsterdam, a city that saw a 20 percent reduction in car traffic in the inner city, as well as a 20 percent decrease in traffic searching for a place to park, since strict parking enforcements were implemented. In Copenhagen, Denmark, traffic dropped by 6 percent in five years, despite a 13 percent increase in car ownership over the same period.

Parking charges are less controversial than congestion charges -- a tax to drive in city centers during peak hours -- and more likely to pass in a vote, said Kodransky.

Dealing with parking is also politically challenging, he added, but the public is more likely to accept it if they know that the revenues will be used to make public spaces more pleasant -- in Barcelona, Spain, 100 percent goes to the bike share scheme, for example.

Parking regulations work best when done in concert with other policies, said Deron Lovaas, federal transportation policy director at the Natural Resources Defense Council.

"They have to be part of a package, and that has to be communicated to consumers," he said.

He added that the measuring of vehicle miles is a fair reflection of how emissions might stack up. "It doesn't make much sense to rank them in isolation," he said.

**American cities mandate space availability**

The fact that this study was done in Europe "points to the likelihood that there hasn't been much progress at all" in the United States, said Lovaas.

However, Donald Shoup, a professor of urban planning at the University of California, Los Angeles, says that some cities have shown efforts to reduce car use through parking enforcement.

One example is in Washington, D.C., where council member Tommy Wells introduced a performance parking pilot program almost three years ago that set higher meter rates around the city's baseball stadium. "On every block there should be one vacant place," said Shoup. "If there's no vacant place, the price is too low."

Shoup is a leader in the field of limiting parking for smart growth. His 2005 book "The High Cost of Free Parking" has garnered ardent followers, or "Shoupistas," according to Lovaas.

He adds that city zoning rules have traditionally mandated a minimum amount of parking. Now, governments must instead demand a maximum number of spaces in order to cut car dependency.

"It isn't as though there wasn't any regulation; the regulation is to require a lot of parking," said Schoup. "We've been regulating badly; our regulations have done a lot of damage."

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***http://www.eurekalert.org/pub_releases/2011-01/mali-cec012511.php***

## Caffeine energizes cells, boosting virus production for gene therapy applications

***New Rochelle, NY, January 25, 2011—Give caffeine to cells engineered to produce viruses used for gene therapy and the cells can generate 3- to 8-times more virus, according to a paper published in Human Gene Therapy, a peer-reviewed journal published by Mary Ann Liebert, Inc. (www.liebertpub.com). The paper is available free online at www.liebertpub.com/hum***

This simple and inexpensive strategy for increasing lentivirus production was developed by Brian Ellis, Patrick Ryan Potts, and Matthew Porteus, University of Texas Southwestern Medical Center, Dallas. In their paper, "Creating Higher Titer Lentivirus with Caffeine," they emphasize that the timing of caffeine addition to standard lentiviral production protocols is important for achieving higher virus titers. Caffeine concentration is also critical, as too much caffeine was toxic to the cells and did not increase virus production.

Lentivirus vectors are commonly used for transferring genes into cells for both research applications in the laboratory and, increasingly, for gene therapy procedures in clinical testing. The addition of caffeine "should significantly decrease the cost of lentiviral production for research and clinical uses," conclude the authors.

"It is ironic that the ingredient in beverages like colas and coffees that helps keep us awake and alert is also useful in jazzing up cells to produce more gene therapy vectors. An increase in vector production of 5-fold may prove critical in establishing the commercial viability of lentiviral based products," says James M. Wilson, MD, PhD, Editor-in-Chief, and Director of the Gene Therapy Program, Department of Pathology and Laboratory Medicine, University of Pennsylvania School of Medicine, Philadelphia.

http://www.eurekalert.org/pub_releases/2011-01/njh-nma012511.php

## New method attacks bacterial infections on contact lenses

***Researchers at National Jewish Health and the University of Texas Southwestern Medical Center have discovered a new method to fight bacterial infections associated with contact lenses.***

The method may also have applications for bacterial infections associated with severe burns and cystic fibrosis. The results were published online January 18 in the journal Investigative Ophthalmology and Visual Science.

"Infections by the bacteria Pseudomonas aeruginosa can cause severe scarring and vision loss when they spread to the cornea," said senior author Jerry Nick, MD, Associate Professor of Medicine at National Jewish Health. "By breaking apart a molecular scaffolding that encases the organisms and makes them more difficult to eradicate, we were able to significantly reduce bacterial infection of the cornea."

The eye normally fights infections through a variety of defense mechanisms including blinking of the eyes, which helps remove bacterial organisms from the surface of the eye. Contact lenses, however, inhibit the effectiveness of blinking eyelids. Thus, bacteria can adhere to the surface of the contact lens that sits against the eye. If those bacteria infect the corneal surface they can destroy the delicate corneal cells, which can lead to scarring and vision loss. The condition is known as microbial keratitis, and affects about two to four lens wearers per 10,000 each year.

Eye infections can be treated with antibiotics. However, it can be difficult to eliminate the bacteria on the contact lenses, especially when they form a biofilm. A biofilm is a matrix that harbors and encases communities of the organisms, making them harder to eradicate.

The researchers confirmed earlier findings that cellular debris from immune cells fighting the infection actually provide the raw materials for the biofilm - DNA, actin and histones. So, they used the enzyme DNAase together with negatively charged poly aspartic acid to break down the chemical bonds of these elements that support the biofilm.

This treatment reduced biofilms on the contact lenses by 79.2 percent. The same treatment reduced infection of the cornea in an animal model by 41 percent. There was no evidence of any harm caused by the treatments. "These are very promising early results that point to potentially new methods for removing bacterial biofilms from contact lens surfaces, thereby reducing the risk of microbial keratitis, as well as the for the treatment of infections by Pseudomonas that are associated with cystic fibrosis and severe burns,' said Danielle Robertson, OD, PhD, first author and Assistant Professor of Ophthalmology at UT Southwestern, and first author on the study.

http://www.eurekalert.org/pub_releases/2011-01/uog-omd012511.php

## Operation makes dementia patients faster and smarter

***Researchers from the University of Gothenburg and Sahlgrenska University Hospital are the first in the world to show that an operation can help patients with dementia caused by white matter changes and hydrocephalus.***

Presented in the American Journal of Neurosurgery, the results are based on the world's first study to demonstrate the effects of a shunt operation using a placebo control. 14 patients were followed for an average of three and a half years after the operation, with half being given a non-functioning shunt – in other words a sham operation – and the other half a functioning shunt. This is the equivalent to the placebo given in drug trials to determine how much of the treatment's effect is down to the patient's and others' expectations.

"For obvious reasons, this is problematic in a surgical context and surgical placebo studies are highly unusual," says Magnus Tisell, docent at the Sahlgrenska Academy and consultant neurosurgeon at Sahlgrenska University Hospital. "However, if you can actually do this kind of study, the level of evidence is the highest possible - class 1."

The researchers found that patients' mental functions and ability to walk improved tangibly after having a shunt inserted. Half were given an open shunt right from the start and showed immediate improvement, while the other half were initially given a closed shunt and improved only after three months when the shunt was opened.

"Shunt operations have long been used for hydrocephalus, but this study offers more scientifically conclusive results to support the effect of the treatment, and also shows that shunt operations can help far more patients than previously believed with their walking and memory," says Tisell.

Surgery is not generally used today for patients with hydrocephalus and white matter changes. But the researchers' findings pave the way for a brand new group of patients who could benefit from a shunt operation.

"We believe that far more patients than is currently the case could benefit from a shunt operation, which will require more resources," says Tisell. "We also need to find out more about which patients are good candidates for the operation and which shunt is best in each particular case."

***HYDROCEPHALUS***

*Hydrocephalus is caused by excessive fluid collecting in the brain's cavities. Patients often have problems walking, and their ability to think and remember is also affected. The fluid can be drained through a shunt, a narrow plastic tube that is surgically inserted into one of the brain's cavities and linked to the stomach or heart. In some cases keyhole surgery can make it possible for the fluid to be absorbed into the bloodstream. Around 400 adults a year receive surgery for different types of hydrocephalus in Sweden.*

***Publication data*** *Journal: Journal of Neurosurgery Title: Shunt surgery in patients with hydrocephalus and white matter changes. Authors: Magnus Tisell ,Mats Tullberg, Per Hellström, Mikael Edsbagge, Mats Högfeldt, Carsten Wikkelsö*

***http://www.eurekalert.org/pub_releases/2011-01/fhcr-hfa012511.php***

## Hot flushes are linked with a significant reduction in breast cancer risk

### *The more frequent and severe the hot flushes, the lower the cancer risk*

SEATTLE – Women who have experienced hot flushes and other symptoms of menopause may have a 50 percent lower risk of developing the most common forms of breast cancer than postmenopausal women who have never had such symptoms, according to a recent study by researchers at Fred Hutchinson Cancer Research Center.

The results of the first study to examine the relationship between menopausal symptoms and breast cancer risk are available online ahead of the February print issue of Cancer Epidemiology Biomarkers and Prevention.

The protective effect appeared to increase along with the number and severity of menopausal symptoms, according to senior author Christopher I. Li, M.D., Ph.D., a breast cancer epidemiologist in the Hutchinson Center's Public Health Sciences Division. "In particular we found that women who experienced more intense hot flushes – the kind that woke them up at night – had a particularly low risk of breast cancer," he said.

Li and colleagues suspected a link between menopause misery and decreased breast cancer risk because hormones such as estrogen and progesterone play an important role in the development of most breast cancers, and reductions in these hormones caused by gradual cessation of ovarian function can impact the frequency and severity of menopausal symptoms.

"Since menopausal symptoms occur as hormone levels fluctuate and drop, we hypothesized that women who experienced symptoms such as hot flushes and night sweats – particularly frequent and severe symptoms – might have a lower risk of breast cancer due to decreased estrogen levels," he said.

Indeed, the researchers found a 40 percent to 60 percent reduction in the risk of invasive ductal and invasive lobular carcinoma – the two most common types of breast cancer – among women who experienced hot flushes and other symptoms. The association between such symptoms and decreased cancer risk did not change even after the researchers accounted for other factors known to boost breast cancer risk, such as obesity and use of hormone replacement therapy.

For the study, which was funded by the National Cancer Institute, Li and colleagues interviewed 1,437 postmenopausal Seattle-area women, 988 of whom had been previously diagnosed with breast cancer and 449 of whom had not, who served as a comparison group. The women were surveyed about perimenopausal and menopausal symptoms ranging from hot flushes, night sweats and insomnia to vaginal dryness, irregular or heavy menstrual bleeding, depression and anxiety.

"While menopausal symptoms can certainly have a negative impact on quality of life, our study suggests that there may be a silver lining if the reduction in breast cancer risk is confirmed in future studies," Li said. "If these findings are confirmed, they have the potential to improve our understanding of the causes of breast cancer and improve approaches to preventing this disease."

***http://www.eurekalert.org/pub_releases/2011-01/wuso-bfw011911.php***

## Biologists' favorite worm gets viruses

### *Finding means C. elegans may aid studies of human infections*

A workhorse of modern biology is sick, and scientists couldn't be happier.

Researchers at Washington University School of Medicine in St. Louis, the Jacques Monod Institute in France and Cambridge University have found that the nematode C. elegans, a millimeter-long worm used extensively for decades to study many aspects of biology, gets naturally occurring viral infections.

The discovery means C. elegans is likely to help scientists study the way viruses and their hosts interact.

"We can easily disable any of C. elegans' genes, confront the worm with a virus and watch to see if this makes the infection worse, better or has no effect," says David Wang, PhD. "If it changes the worm's response to infection, we will look to see if similar genes are present in humans and other mammals."

Wang notes that several fundamental aspects of human biology, including the ability of cells to self-destruct to prevent cancer, and RNA interference, an important process for regulating how genes are used to make proteins, were first identified in C. elegans and later affirmed to be present in humans.

The findings appear online in PLoS Biology.

Marie-Anne Felix, PhD, a researcher who studies nematodes at the Monod Institute, began the study by gathering C. elegans from rotting fruit in French orchards. Felix noted that some of her sample worms appeared to be sick. Treatment with antibiotics failed to cure them.

Felix then repeated a classic biology experiment that led to the discovery of viruses.

"She ground up the sick worms, passed them through a filter fine enough to remove any bacterial or parasitic infectious agents, and exposed a new batch of worms to the ground-up remains of the first batch," Wang says. "When the new batch got sick, she knew that a viral infection was likely to be present."

Wang, associate professor of pathology and immunology and of molecular microbiology, specializes in the identification of novel viruses. He found the worms had been suffering infections from two viruses related to nodaviruses, a class of viruses previously found to infect insects and fish. Nodaviruses are not currently known to infect humans. Tests showed one of the new viruses can infect the strain of C. elegans most commonly used in research.

"Model organisms are essential to important steps forward in biology, and we're eager to see what C. elegans can teach us about the way hosts and viruses interact," Wang says.

*Felix M-A, Ashe A, Piffaretti J, Wu G, Nuez I, Belicard T, Jiang Y, Zhao G, Franz CJ, Goldstein LD, Sanroman M, Miska EA, Wang D. Natural and experimental infection of Caenorhabditis nematodes by novel viruses related to nodaviruses. PLoS: Biology, January 25, 2011.*

*Funding from the French National Center for Scientific Research, the National Institutes of Health, the Midwest Regional Center for Excellence for Biodefense and Emerging Infectious Diseases Research, the Cancer Research UK Programme, the Burroughs-Wellcome Fund, and the Herchel-Smith Foundation supported this research.*

***http://www.eurekalert.org/pub_releases/2011-01/uoh-apl012511.php***

## A psychopath lacks empathy just like a person with frontal head injury

***'Seeing as psychopathic behavior is similar to that of a person with brain damage, it could be that it could benefit from similar forms of treatment,' said Dr. Simone Shamay-Tsoory, who conducted the study***

"Seeing as psychopathic behavior is similar to that of a person with brain damage, it could be that it could benefit from similar forms of treatment," said Dr. Simone Shamay-Tsoory, who conducted the study.

People diagnosed as psychopathic have difficulty showing empathy, just like patients who have suffered frontal head injury. This has been shown in a new study from the University of Haifa. "Our findings show that people who have psychopathic symptoms behave as though they are suffering frontal brain damage," said Dr. Simone Shamay-Tsoory, who conducted the study.

Psychopathy is a personality disorder that finds expression in extreme anti-social behavior and intentional harm to others, including a lack of compassion and empathy. An existing explanation for such behavior suggests inability to comprehend the existence of emotions in others. However, the fact that many psychopaths act with sophistication and deceit with intention to harm others, indicates that they actually have a good grasp of the mental capacity of others - and are even capable of using that knowledge in order to cause them harm.

Earlier research by Dr. Shamay-Tsoory has examined individuals with frontal head injury, i.e., damage to parts of the brain that are responsible for emotional functioning. She has shown that people suffering this type of brain damage have difficulty showing empathy. Having observed similar emotional deficiency in psychopathic behavior, she set out to see if there is in fact a similarity between the two cases.

The current study assessed 17 people who had been diagnosed by psychiatrists as psychotic – and not suffering from any known brain damage; and another 25 individuals suffering frontal lobe injury. Each of the participants underwent a computerized test examining cognitive ability to recognize feelings in another and the ability to demonstrate empathy for another's emotions. They were also tested to gage their capacity to understand another's thoughts. The results of these tests showed that both groups demonstrated a similar difficulty in showing empathy, while two control groups of individuals with no known mental disorders or brain damage and individuals with non-frontal brain damage both showed different results with positive empathy capabilities.

"Seeing as psychopathic behavior is similar to that of a person with brain damage, it could be that it could benefit from similar forms of treatment," Dr. Shamay-Tsoory noted.

***http://www.eurekalert.org/pub_releases/2011-01/sfgm-hli012411.php***

## Heart-targeting Listeria increase cardiac disease risk

***Certain strains of the food pathogen Listeria are uniquely adapted to infect heart tissues and may put people at a higher risk from serious cardiac disease, according to a new study published in the Journal of Medical Microbiology.***

Developing new diagnostic tests to identify these potentially fatal strains could protect those most at risk, such as those with heart valve replacements.

Researchers from the University of Illinois, Chicago have shown that a sub-population of the bacterium Listeria monocytogenes display an enhanced ability to infect cardiac tissue. They found that mice infected with certain strains of L. monocytogenes had 10-15-fold more bacteria in their heart tissues than mice infected with other strains.

L. monocytogenes is a serious food-borne pathogen which may be found in soft cheeses and chilled ready-to-eat products. Less severe infections lead to gastroenteritis. Serious infections are most commonly associated with the central nervous system or with the developing fetus in pregnant women. Dr Nancy Freitag who led the study explained how a subset of infections progress differently. "A significant number - about 10% - of L. monocytogenes infections involve the heart. In these cases death rate from cardiac illness is estimated to be up to 35% yet very little is known about how these bacteria infect heart tissues."

The results of the study suggest that these cardiac-associated strains display modified proteins on their surface that enable the bacteria to target the heart, leading to bacterial infection. "We found distinct genetic similarities between the cardioinvasive Listeria versus the other strains that we compared. These similarities all related to the surface proteins on the bacteria," said Dr Freitag.

The group are hoping to develop diagnostic tests based on bacterial genetic markers. "These tests could be used to distinguish strains of Listeria isolated from food outbreaks, food processing plants, or from clinical infections that place patients at increased risk of cardiac disease," suggested Dr Freitag. "This would allow health care workers and food safety officials to closely monitor exposed individuals."

The ability to identify cardiac-targeting strains of Listeria could improve infection outcomes and help protect vulnerable groups. "Patients with heart valve replacements or prior cardiac illness are believed to be more susceptible to Listeria cardiac infections. It is not clear exactly why this is so, but it could be that damaged tissue provides an additional entry way for infection," explained Dr Freitag. "We believe that this risk may be increased if the individuals are exposed to cardiac-targeting strains," she said.

***http://www.bbc.co.uk/news/health-12274271***

## Deep brain stimulation surgery 'first' for depression

***A medical team at Frenchay Hospital in Bristol is pioneering a new form of surgery to treat long term depression.***

The technique, deep brain stimulation, involves the use of electrodes which are implanted into the brain through holes drilled in the skull.

The electrodes are attached to a battery pack which delivers small amounts of electricity to stimulate or inhibit specific areas in the brain. A trial is comparing the effects of stimulating two different brain areas.

The first patient to have the electrodes inserted was Sheila Cook, 62, from Torquay who had been suffering from severe depression for nine years. She says: "I just wanted life to end. It was like being in a dark tunnel, but instead of there being light at the end of it, it was just darkness."

In Sheila's case the deep brain stimulation only had a short term benefit so she went on to have a second operation, called ablative surgery, to further improve her condition. She says: "I suddenly woke up in the morning and I thought I feel different, I want to get up, I want to do things. And my whole view of life changed."

The research team hopes that deep brain stimulation might one day replace the more destructive ablative surgery that Sheila received. The results from seven further participants on the trial will be published later in the year.

***http://www.physorg.com/news/2011-01-linguists-re-think-short-words.html***

## Linguists to re-think reason for short words

**(PhysOrg.com) --** ***Linguists have thought for many years the length of words is related to the frequency of use, with short words used more often than long ones***

Now researchers in the US have shown the length is more closely related to the amount of information the words carry than their frequency of use.

A link between the length of words and how frequently they are used was first proposed in 1935 by George Kingsley Zipf, a Harvard University linguist and philologist. Zipf's idea was that people would tend to shorten words they used often, to save time in writing and speaking. The relationship seems intuitive and it seems to apply to many languages with short words such as “the”, “a”, “to”, “and”, “so” (and equivalents in other languages) being frequently used.

Researchers at the Massachusetts Institute of Technology (MIT), led by Steven Piantadosi, tested the Zipf relationship by analysing word use in 11 European languages. They analyzed digitized texts for correlations between words by counting how often all pairs of words occurred in sequence. This information was then used to estimate the probability of words occurring after given previous words or sequences of words. They made the

assumption that the more predictable a word is, the less information it conveys, and estimated the information content from information theory, which says the information content is proportional to the negative logarithm of the probability of a word occurring.

Piantadosi said if the word length is directly related to information content this would make the transmission of information through language more efficient and also make speech and written texts easier to understand. This is because shorter words, carrying less information, would be scattered through the speech, essentially "smoothing out" the information density and delivering the important information at a steady rate.

The studies suggest that the short words are in fact the least informative and most predictable words rather than the most often used, and that word length is more closely related to the information the words contain.

The paper is soon to be published in the Proceedings of the National Academy of Sciences (PNAS). Steven Piantadosi belongs to the PhD program with MIT's Department of Brain and Cognitive Sciences.

*More information: Piantadosi, S. T., et al. Proceedings of the National Academy of Sciences (2011). PNAS paper will appear online at http://dx.doi.org/ ... s.1012551108*

***http://www.bbc.co.uk/news/health-12275507***

## Common weed petty spurge 'could treat' skin cancer

**By Michelle Roberts Health reporter, BBC News**

***Sap from the common garden weed petty spurge appears to treat non-melanoma skin cancers, experts are reporting in the British Journal of Dermatology.***

But they tell patients not to "try it at home" since the treatment is still experimental and can irritate the skin.

Their study involved 36 patients with non-melanoma skin cancer lesions.

Although not the most serious form of skin cancer, non-melanoma lesions are very common, accounting for a third of all cancers detected in the UK. They include basal cell carcinoma (BCC) and squamous cell carcinoma (SCC) and usually occur in older people. Most cases of non-melanoma skin cancer can be easily treated and cured with surgical removal or freezing, or using a special kind of light therapy that kills the cancer cells. However, for some people these treatments will fail or are not deemed suitable.

**Promising early findings**

The study involved 36 of such patients who collectively had a total of 48 non-melanoma lesions. Each was treated with the sap of the petty spurge plant, or Euphorbia peplus (*小口トウダイグサ*), which was applied to the skin once a day for three days. The plant sap has been used for centuries as a traditional medicine, and the researchers wanted to put it through its paces in a proper clinical trial.

After a one month, 41 of the 48 cancers had shown a complete clinical response to the treatment, meaning no trace of the tumour could be found on clinical examination. Patients who experienced only a partial response to the first round of treatment were then offered a second course.

The lesions which responded positively to one or two courses of treatment were then followed up further for between two and 31 months. After an average of 15 months following treatment, two thirds (68.5% or 30 of the 48) of the skin cancer lesions were still showing a complete response. The researchers say large-scale studies are now needed to test the active ingredient in the weed's sap, a substance called Ingenol mebutate, as a potential new treatment option. Studies show that when Ingenol mebutate is applied to the skin it not only kills the cancerous cells but also recruits white blood cells known as neutrophils that appear to reduce the risk of relapse by destroying any residual malignant cells that could allow the tumour to re-grow.

Kimberley Carter of the British Association of Dermatologists said: "This is a very small test group so it will be interesting to see what larger studies and the development of the active ingredient in E. peplus sap will reveal.

"Whilst it would not provide an alternative to surgery for the more invasive skin cancers or melanoma, in the future it might become a useful addition to the treatments available to patients for superficial, non-melanoma skin cancers. "Any advances that could lead to new therapies for patients where surgery is not an option are definitely worth investigating. "It is also very important to note that this is definitely not a treatment people should be trying out at home. "Exposure of the sap to mucous producing surfaces, such as the eyes, results in extreme inflammation and can lead to hospitalisation."

Cancer Research UK said that people with suspect skin lesions should continue to see doctors who can advise the best treatment.

***http://www.physorg.com/news/2011-01-alcohol-curbed-anti-nausea-medication.html***

## Alcohol use curbed by anti-nausea medication, study finds

***Alcoholics who were given a medication approved for quelling nausea were able to cut back on their alcohol intake, researchers reported this week.***

The medication, ondansetron (Zofran), could become a readily available therapy for helping some alcoholics become abstinent. The study, published Wednesday in the American Journal of Psychiatry, is based on research

on a gene known as 5-HTT that is important to the serotonin system of the brain. Certain variants of this gene can increase the risk of psychiatric disorders, such as depression, anxiety, obsessive-compulsive disorder and addiction.

Ondansetron is used to prevent nausea and vomiting caused by cancer chemotherapy. But it's in a class of medications that work by blocking serotonin. The study tested the idea that a drug to block this neurotransmitter in genetically susceptible people might reduce the severity of their drinking.

Researchers analyzed the genotype of 283 alcoholics who were still drinking. They found that those with the 5-HTT LL genotype who received ondansetron took fewer drinks per day and had more days of abstinence over the 11-week study compared with people with the LL genotype who did not receive the drug. All the study participants received cognitive-behavioral therapy aimed at helping them become abstinent.

Among the patients who received ondansetron, those with the LL genotype or another variant called LL/TT cut back on their drinking enough to move out of the "high-risk" category of drinkers. But the drug did not seem to help patients who had other forms of the 5-HTT genotype.

The study was led by Bankole A. Johnson, chairman of the department of psychiatry and neurobehavioral sciences at the University of Virginia, and an expert in medications used to treat addiction. His paper on the use of topiramate - an anti-seizure medication - to treat alcoholism was published in the Journal of the American Medical Association in 2007.

In an e-mail, Johnson said that ondansetron had a stronger effect on promoting abstinence than topiramate in the LL genotype group. "Genotyping is becoming more common place and inexpensive," he said, opening the door to tailoring addiction treatment based on an individual's genes.

***http://www.physorg.com/news/2011-01-painkiller-apparent-side-effects-addictive.html***

## New painkiller with no apparent side effects or addictive qualities near to market

**(PhysOrg.com) --** ***A powerful new painkiller, which was developed on the basis of the research conducted at Stony Brook University and with no apparent side effects or addictive qualities, may now be only a year or two from the consumer market.***

"This offers a major paradigm shift in the control of pain," declares Dr. Simon Halegoua, Professor of Neurobiology & Behavior at Stony Brook who in the 1990s, teamed up with fellow Stony Brook professors Dr. Gail Mandel and Dr. Paul Brehm to identify a novel sodium ion channel involved in the transmission of pain. They predicted that a drug aimed at blocking this channel, PN1/Nav 1.7, would control pain. PN1 (Peripheral Neuron 1), is uniquely expressed in peripheral nerves such as those involved in pain transduction.

"When a patient is given an opiate like morphine, pain signals are still transmitted from sensory nerves to the central nervous system. Morphine action throughout the brain reduces and alters pain perception, but it also impairs judgement and results in drug dependence," explains Halegoua, also director of the Center for Nervous System Disorders at Stony Brook University. "With drugs targeting the PN1/Nav1.7 sodium ion channel, the pain signals would not be transmitted, even by the sensory nerves. And since the central nervous system is taken out of the equation, there would be no side effects and no addictive qualities."

The potential for such drugs is enormous – the reduction or elimination of pain for patients with cancer, arthritis, migraine headaches, muscle pain, pain from burns, and pain from other debilitating diseases.

He notes that drugs in both oral and topical ointment forms, based on the research he conducted in a basement laboratory at Stony Brook with Mandel, a molecular biologist, and Brehm, an electrophysiologist, are currently in Phase II clinical trials in England and Canada.

The Research Foundation of the State University of New York is the holder of the various patents originating from the work of the Stony Brook researchers. Icagen Inc., now in partnership with Pfizer, holds the exclusive license to these patents and has announced their own drug has now entered Phase I clinical trials in the U.S.

*Provided by Stony Brook University*

***http://www.physorg.com/news/2011-01-money-literally.html***

## See where your money is going -- literally

***Kathy Williamson was over in the Pigeon Forge area in early December and stopped into a Harry & David store in Sevierville, Tenn., to buy candy. The change she received from the clerk was correct, but she noticed something odd about one of the singles given her.***

Someone had used a red felt-tip to circle the bill's serial number, to draw a heart around the series number, and to write "Currency tracking study" on the dollar's left edge. And to the left of the first president's head, there was a blue stamp mark that read, "Track me at www.wheresgeorge.com."

So after she returned home to Charlotte, she visited that website and learned the dollar had been registered in eastern Tennessee five days and 22 hours before and now had gone 122 miles - at 28 miles per day.

Welcome to Where's George - a project that seems part "Where's Waldo" (paper-based hunting activity), part "Flat Stanley" (tracking where a particular object is physically moving) and is fully wired. People enter the serial numbers of a bill, mark the currency and wait to see whether the paper money turns up elsewhere: Someone else can go to the site, punch in the serial number, and learn where it has been.

At the site's home page, live blurbs pop up from around America that note things like:

Casper, WY
1st hit
It came from an LWML Mites donation at church.

Or this:

Huntsville, AL
1st hit
Got this bill as part of a tip for delivering pizzas.
Good condition.

Consider it artificial traveling: You may not be going anywhere. But the contents of your wallet are.

The site's "George's Top 10" page lists some remarkable migrations of money, ranging from singles to $100 bills:

-A dollar bill entered on wheresgeorge.com in Dayton, Ohio, in 2002 has logged 15 "hits" over 4,191 miles - most recently in 2005 in Rudyard, Mich., after turning up in places from Utah to Florida.
-A $100 bill migrated from Downey, Calif., to Blackburn, England, and was last spotted in Weaverville, Calif., 538 miles from where it started out.
-A $5 bill launched from Jefferson, Md., turned up a year and 171 days later in Aurora, Colo., after stops in Jamestown, N.C., Florida, Texas and Ontario.

It's likely that some bills registered with the site made their way to Gottingen, Germany, home of the illustrious Max-Planck Institute: In 2006, Dirk Brockmann, an American theoretical physicist working there, used wheresgeorge.com in "The Scaling Laws of Human Travel" - an acclaimed study that used patterns of money migration as a tool to create models for the spread of epidemics.

"It wasn't about germs on the bills themselves," says Hank Eskin. "Brockmann used dollar bills as a proxy for how people move around. Paper money travels with people, so it's a good substitute for how people travel and how diseases spread as a result of that."

Eskin, 46, is the Boston-based Internet consultant who started wheresgeorge.com a dozen years ago to track currency. "I don't collect it," he said in a phone interview this month. "It's more about the technology."

His site has become more than that to casual and die-hard fans (called "georgers") who have logged more than 200 million bills into the wheresgeorge.com database. "Something like 60,000 bills are entered every day," Eskin says.

This is despite the lengthy user guidelines and "frequently asked questions" text at wheresgeorge.com. Some of the verbiage stems from Eskin's desire to track where money naturally flows. He doesn't want people to mail or tote money to exotic locales just to achieve "George's Top 10" status.

Other fine print says the site does not encourage the defacement of money: The Secret Service paid Eskin a visit in 2000. "I was also selling rubber wheresgeorge.com stamps, and they said I basically can't do that. The law says you can't advertise on currency, and that's what they were concerned about. I haven't heard from them since."

Making and using your own little rubber stamp for this is OK, by the way: That's considered marking bills, not defacing them.

**HOW TO DO IT**

1. Go to wheresgeorge.com .
2. Fill out the registration form (it's free).
3. To check the money in your billfold: Click the "I found a Where's George Bill" box (even if you're not sure if it's entered). Type the serial number and your ZIP code.
4. To launch a bill: Click the "I want to enter and track..." box. Fill out the "Enter a bill" form. If you don't have a stamp, just write "www.wheresgeorge.com" in ink in the margin of the bill.

**MEANWHILE, NORTH OF THE FRONTIER ...**

Eskin also operates a site that similarly tracks Canadian paper money. It's called whereswillie.com, after the person on Canada's lowest-denomination banknote - the five-spot: Wilfrid Laurier, prime minister during World War I.

There are also currency-tracking sites in other countries. 

http://www.nytimes.com/2011/01/25/health/25doctors.html

# As Doctors Age, Worries About Their Ability Grow

**By LAURIE TARKAN**

***About eight years ago, at the age of 78, a vascular surgeon in California operated on a woman who then developed a pulmonary embolism. The surgeon did not respond to urgent calls from the nurses, and the woman died.***

Even after the hospital reported the doctor to the Medical Board of California, he continued to perform operations for four years until the board finally referred him for a competency assessment at the University of California, San Diego.

"We did a neuropsychological exam, and it was very abnormal," said Dr. William Norcross, director of the physician assessment program there, who did not identify the surgeon. "This surgeon had visual-spatial abnormalities, could not do fine motor movements, could not retain information, and his verbal I.Q. was much lower than you'd expect." Yet "no one knew he had a cognitive deficit, and he did not think he had a problem," Dr. Norcross continued. The surgeon was asked to surrender his medical license.

One-third of the nation's physicians are over 65, and that proportion is expected to rise. As doctors in the baby boom generation reach 65, many are under increasing financial pressures that make them reluctant to retire.

Many doctors, of course, retain their skills and sharpness of mind into their 70s and beyond. But physicians are hardly immune to dementia, Parkinson's disease, stroke and other ills of aging. And some experts warn that there are too few safeguards to protect patients against those who should no longer be practicing. "My guess is that John Q. Public thinks there is some fail-safe mechanism to protect him from incompetent physicians," Dr. Norcross said. "There is not."

Often the mechanism does not kick in until a state medical board has found it necessary to discipline a physician. A 2005 study found that the rate of disciplinary action was 6.6 percent for doctors out of medical school 40 years, compared with 1.3 percent for those out only 10 years.

In 2006, a study found that in complicated operations, patients' mortality rates were higher when the surgeon was 60 or older, though there was no difference between younger and older doctors in routine operations.

Patient advocates note that commercial pilots, who are also responsible for the safety of others, must retire at age 65 and must undergo physical and mental exams every six months starting at 40. Yet "the profession of medicine has never really had an organized way to measure physician competency," said Diane Pinakiewicz, president of the nonprofit National Patient Safety Foundation. "We need to be systematically and comprehensively evaluating physicians on some sort of periodic basis."

Some experts are calling for regular cognitive and physical screening once doctors reach 65 or 70, and a small cadre of hospitals have instituted screening for older physicians. Some specialty boards already require physicians to renew their certification every 7 to 10 years and have toughened recertification requirements. But such policies have met resistance from rank-and-file doctors.

"I do not believe that diminished competence attributable solely to age is a significant factor in the underperformance of most poor-performing physicians," Dr. Henry Homburger, 64, professor of laboratory medicine at the Mayo Clinic, said by e-mail. Mental illness like depression, substance abuse and a "failure to maintain competence through continuing education far outweigh age as causes of poor performance, in my opinion," he wrote.

Others doubt that a single type of exam can be used to assess the performance of doctors from a variety of specialties. "More research is needed for us to define what combination of cognitive and motor issues are important," said Dr. Stuart Green, a member of the ethics committee of the American Academy of Orthopaedic Surgeons.

Physicians do have to meet minimal requirements to continue to practice. To renew a medical license in most states, doctors must complete a certain number of hours of continuing medical education every year or two.

This does not impress experts like Dr. Norcross. "You can be asleep during those courses and no one would know," he said.

Even the tougher new policies of specialty boards do not usually apply to older physicians, who, because of "grandfather" clauses, are not required to renew their certification — an expensive, time-consuming process.

They are being encouraged to do so voluntarily, but few do — less than 1 percent of the 69,000 so-called grandfathered members of the American Board of Internal Medicine, for example.

Doctors with mild cognitive impairment may not be aware they have a problem or their performance is flagging. Changes are often subtle at first: a person may not be able to recall words, learn new material, apply knowledge to solving problems or multitask.

These deficits can make it hard to carry out the latest recommendations for diagnosis and treatment, learn new computer-based technology, remember prescribing details about medications, or function well in a stressful environment like the emergency room. Only when a doctor's behavior starts to become odd are other physicians, nurses and patients likely to take notice.

Medical professionals are supposed to report colleagues' unsafe practices and bad behavior. But doctors are reluctant to confront their fellow physicians, especially their seniors, who may have trained them. "Sometimes we empathize too much and have difficulty making the hard calls when we need to," Dr. Norcross said.

Doctors often cover for physicians who are becoming less sharp, by having another surgeon in the operating room or by regularly reviewing their cases, Dr. Green said.

Dr. John Fromson, associate director of postgraduate medical education at Massachusetts General Hospital, cited a case at another medical center in New England, where physicians noticed cognitive changes in the 77-year-old chairman of internal medicine. He was highly respected and had trained most of the physicians at the center, so they were reluctant to confront him. Instead, they gave him a retirement party, hoping he would take the hint. "But he didn't," Dr. Fromson said. "He kept on working."

Dr. Fromson staged an intervention, at which four or five of the doctor's close colleagues confronted him as compassionately as they could. "We reaffirmed our concern and caring for him, and asked him to hand over his medical license," he said. "He became quite tearful, but he did."

To lift this burden from peers while protecting patients, 5 percent to 10 percent of hospitals around the country have begun to address the issue of aging physicians more systematically, said Dr. Jonathan Burroughs, a consultant with the Greeley Company, which advises hospitals and health care companies.

"The other 90 to 95 percent are not willing to take this on," he said. In some instances, their efforts have been squashed by a vocal medical staff.

At Driscoll Children's Hospital in Corpus Christi, Tex., Dr. Karl Serrao, the credentials chairman, decided to move slowly and enlisted the staff's help in drafting a policy for aging physicians. The staff expressed concerns about age discrimination, losing the valuable experience of older physicians and invasion of privacy. Now the hospital's policy states that when doctors 70 and older are up for reappointment, they must undergo cognitive and physical exams that assess skills specific to their specialty.

Dr. Burroughs says that screening physicians may be a more compassionate route than doctors think. "By identifying the issue early enough, it enhances their chance of being able to practice longer," he said. When a cognitive deficit is discussed openly, the physician's practice can be simplified, he can reduce his patient load, and his partners can regularly monitor and assess his work.

"But once something bad happens," Dr. Burroughs said, "he'll get his license taken away."

***http://www.scientificamerican.com/blog/post.cfm?id=background-noise-elderly-drivers-mi-2011-01-25***

## Background noise: Elderly drivers might have a brain region to blame for declining driving skills

**By Katherine Harmon Tuesday, January 25, 2011**

***Debate about older adults' driving skills often touches on obvious impairments, such as failing vision and heavy medication use.***

But a new study suggests a deeper neurological explanation for why seniors have a hard time spotting obvious objects on the road: They might actually just be better at perceiving large-scale movement in the background, an ability that could compete with attention paid to smaller objects in the foreground.

"The amount of visual information around us is huge, and we don't have the brain power to process it all," Duje Tadin, of University of Rochester's Department of Brain and Cognitive Sciences, said in a prepared statement. So, to prioritize, the brain uses "spatial suppression" to filter out what it deems less relevant visual information, which is often that coming from the background.

Tadin and his colleagues hypothesized that this spatial suppression was being mediated at least in part by the middle temporal visual area and so by turning down this area's function—as might happen in older adults—they could also reduce spatial suppression. The results were published online January 25 in The Journal of Neuroscience.

The research team used transcranial magnetic stimulation to send mild electrical current to the middle temporal visual area of the cortex. After 15 minutes of the 1 Hz stimulation to the noggins of six young healthy volunteers, the researchers found that the subjects were much more attuned to broader movements in the background than they had previously been. "Disruption of [the middle temporal visual area] improved motion discrimination of large, moving stimuli," the researchers wrote in their paper.

The tamping down of the middle temporal visual area did not, however, seem to affect perception of small foreground objects' movement. Thus, with the brain receiving even more visual data, it might become less efficient at focusing on the important stuff—such as a person dashing across the road.

The findings also might have implications for populations other than the elderly, including people with schizophrenia or depression. "These paradoxical results mimic special population findings," the researchers noted. "Particularly patients with a history of depression who exhibit better-than-normal motion perception of large patterns coupled with normal perception of small, moving stimuli." By better understanding what parts of the brain might be contributing to altered visual processing, researchers might some day be able to develop improved disease models and possibly even treatments.

***http://www.physorg.com/news/2011-01-pay-for-performance-patient-health.html***

## Pay-for-performance does not improve patient health: study

***As news outlets throughout Europe and the U.S. report on the plummeting health of Western adults and children, there is no shortage of culprits.***

One villain often bandied about is the "fee for service" system of incentives for physicians. Clearly, if doctors are financially rewarded for simply performing more procedures, costs will soar at the expense of patient health.

Enter Pay-for-Performance, an emerging movement in which physicians are rewarded not for what they do, but for quality of care and patient outcomes. Under such a system, economic logic dictates that patients should theoretically show marked improvements when doctors' incentives shift from procedure to patient.

This new approach was implemented in the United Kingdom in 2004 in a program termed "Quality and Outcomes Framework." But whether or not such an approach has actually improved patient health remains an open question.

A new study published January 26 in BMJ presents the strongest evidence yet that Pay-for-Performance does not offer any benefit to patients with hypertension, despite the enormous administrative costs required to maintain such a system.

"No matter how we looked at the numbers, the evidence was unmistakable; by no measure did pay-for-performance benefit patients with hypertension," says lead author Brian Serumaga, formerly of Harvard Medical School/Harvard Pilgrim Health Care Institute, but now at University of Nottingham Medical School.

Working closely with researchers at Harvard, Nottingham, and the University of Alberta in Canada, Serumaga and his colleagues focused on how Pay-for-Performance might affect outcomes in patients with hypertension, a condition where other interventions such as patient education have shown to be very effective.

Analyzing data from the UK's Health Improvement Network, a large database of primary care records from 358 UK general practices, the international research team identified 470,725 patients diagnosed with hypertension between January 2000 and August 2007, spanning four years prior, and three years after, Pay-for-Performance was implemented. The researchers looked at various measures including blood pressures over time, rates of blood pressure monitoring, and hypertension outcomes as well as illnesses.

Analysis showed that even after allowing for a number of variations, there was no identifiable impact on the cumulative incidence of stroke, heart attacks, renal failure, heart failure or mortality in both patients who had started treatment before 2001 and patients whose treatment had started close to the implementation of Pay-for-Performance.

"Governments and private insurers throughout the world are likely wasting many billions on policies that assume that all you have to do is pay doctors to improve quality of medical care," says senior author Stephen Soumerai, professor in the Department of Population Medicine at Harvard Medical School and Harvard Pilgrim Health Care Institute. "Based on our study of almost 500,000 patients over seven years, that assumption is questionable at best."

According to Anthony Avery, also of University of Nottingham Medical School, "Doctor performance is based on many factors besides money that were not addressed in this program: patient behavior, continuing MD training, shared responsibility and teamwork with pharmacists, nurses and other health professionals. These are factors that reach far beyond simple monetary incentives."

"Policymakers sometimes legislate large and expensive policies based on their beliefs without the requisite hard evidence," says Soumerai. "Policy makers in the U.S. and in Canada who are attempting to enact such programs need to think hard about other more effective approaches."

*More information: "Has Pay-For-Performance improved the management and outcomes of hypertension in the United Kingdom? An interrupted time-series study" BMJ (British Medical Journal), Wednesday, January 26, online publication*
*Provided by Harvard Medical School*

http://news.discovery.com/animals/bat-carnivorous-plant-bathroom-110125.html

## Bat Uses Carnivorous Plant as a Toilet

***A bat and a carnivorous plant have a mutually beneficial -- and equally disgusting -- relationship.***

**By Jennifer Viegas | Tue Jan 25, 2011 07:00 PM ET**

A bat and a carnivorous plant in Borneo enjoy an unusual, mutually beneficial relationship, according to a new paper. The bat roosts and relieves itself in the plant's prey-trapping pitchers, feeding the plant.

The discovery, outlined in the latest Royal Society Biology Letters, represents only the second known case of a mutualistic association between a carnivorous plant and a mammal. The other case was reported in 2009, when scientists saw three tree shrews pooping into the pitchers of another carnivorous plant.

Although both the bat and the carnivorous plant prey on insects, they are not in competition with each other.

"The bats do not eat the often putrefied insects from the pitcher fluid," lead author Ulmar Grafe told Discovery News. "Even if they wanted to, the pitcher tapers too much to allow the bat access. The bats literally get stuck, that is they wedge themselves in the pitcher below the girdle and cannot wiggle further down towards the pitcher fluid."

Grafe, a University of Brunei Darussalam biologist, and his team made the determinations after placing transmitters on the backs of Hardwicke's woolly bats that were caught in a Brunei Darussalam peat swamp forest. Tracking the bats, the researchers discovered that many chose to rest and sleep in the aerial pitchers of the carnivorous plant Nepenthes rafflesiana, variety elongata. Chemical analysis of the plants found that some 33.8 percent of their nutrients came from the bat poop and urine.

Further investigation of the plants revealed that they put little energy into trapping insects. They released low amounts of insect-attracting volatile compounds and produced little digestive fluid.

Instead, the plants devoted energy towards enticing bats to roost by growing elongated, narrow and cylindrical pitchers that create snug, cozy hideaways for roosting bats.

"In mother-juvenile pairs, the mother will suck the pup in the roost," said Grafe, who explained that most of the plant's pitchers provide enough space for two bats stacked on top of each other. "The average number of bats per plant at any given time was only approximately 2.5 percent," he added. "Realize, however, that it may be sufficient for a plant to attract a bat once in its lifetime as the reward is very high."

He and his colleagues suspect the bat-plant relationship evolved after some bats happened to roost in the plant.

"Coincidental use may have evolved into regular and exclusive use if the pitcher plant responds by making the roost more attractive," he said.

Matthew Struebig, a researcher at the University of Kent's Durrell Institute of Conservation and Ecology, was based in Brunei for a while and witnessed a mother bat and pup together in one of the carnivorous plant's pitchers.

"This is a great study that, for the first time, exposes the mutualistic link between a small woolly bat and its pitcher plant host," Struebig told Discovery News. "There have been anecdotal reports of this bat species being found in pitchers, but most people considered this to be only a temporary arrangement."

Struebig explained that bat experts consider such temporary spots to be a "day roost" or a "satellite roost," "a convenient stop-over on the way to the bat's main home after a night of busy foraging." In this case, though, the pitchers appear to serve as the bat's primary home. Both he and Grafe now wonder if other carnivorous plants in the region enjoy beneficial relationships with bats and different animals.

"Many pitcher plants grow in remote mountainous areas," Grafe said. "Borneo, the world's third largest island, has the highest species richness of any region and most species have not been investigated in much detail."

http://www.eurekalert.org/pub_releases/2011-01/usmc-usr012511.php

## UT Southwestern researchers uncover potential 'cure' for type 1 diabetes

**DALLAS –** ***Type 1 diabetes could be converted to an asymptomatic, non-insulin-dependent disorder by eliminating the actions of a specific hormone, new findings by UT Southwestern Medical Center researchers suggest.***

These findings in mice show that insulin becomes completely superfluous and its absence does not cause diabetes or any other abnormality when the actions of glucagon are suppressed. Glucagon, a hormone produced by the pancreas, prevents low blood sugar levels in healthy individuals. It causes high blood sugar in people with type 1 diabetes.

"We've all been brought up to think insulin is the all-powerful hormone without which life is impossible, but that isn't the case," said Dr. Roger Unger, professor of internal medicine and senior author of the study appearing online and in the February issue of Diabetes. "If diabetes is defined as restoration of glucose homeostasis to normal, then this treatment can perhaps be considered very close to a 'cure.' "

Insulin treatment has been the gold standard for type 1 diabetes (insulin-dependent diabetes) in humans since its discovery in 1922. But even optimal regulation of type 1 diabetes with insulin alone cannot restore normal glucose tolerance. These new findings demonstrate that the elimination of glucagon action restores glucose tolerance to normal.

Normally, glucagon is released when the glucose, or sugar, level in the blood is low. In insulin deficiency, however, glucagon levels are inappropriately high and cause the liver to release excessive amounts of glucose into the bloodstream. This action is opposed by insulin, which directs the body's cells to remove sugar from the bloodstream. Dr. Unger's laboratory research previously found that insulin's benefit resulted from its suppression of glucagon.

In type 1 diabetes, which affects about 1 million people in the U.S., the pancreatic islet cells that produce insulin are destroyed. As a countermeasure to this destruction, type 1 diabetics currently must take insulin multiple times a day to metabolize blood sugar, regulate blood-sugar levels and prevent diabetic coma. They also must adhere to strict dietary restrictions.

In this study, UT Southwestern scientists tested how mice genetically altered to lack working glucagon receptors responded to an oral glucose tolerance test. The test – which can be used to diagnose diabetes, gestational diabetes and prediabetes – measures the body's ability to metabolize, or clear, glucose from the bloodstream.

The researchers found that the mice with normal insulin production but without functioning glucagon receptors responded normally to the test. The mice also responded normally when their insulin-producing beta cells were destroyed. The mice had no insulin or glucagon action, but they did not develop diabetes.

"These findings suggest that if there is no glucagon, it doesn't matter if you don't have insulin," said Dr. Unger, who is also a physician at the Dallas VA Medical Center. "This does not mean insulin is unimportant. It is essential for normal growth and development from neonatal to adulthood. But in adulthood, at least with respect to glucose metabolism, the role of insulin is to control glucagon.

"And if you don't have glucagon, then you don't need insulin."

Dr. Young Lee, assistant professor of internal medicine at UT Southwestern and lead author of the study, said the next step is to determine the mechanism behind this result.

"Hopefully, these findings will someday help those with type 1 diabetes," Dr. Lee said. "If we can find a way to block the actions of glucagon in humans, then maybe we can minimize the need for insulin therapy."

Dr. Unger said anything that reduces the need for injected insulin is a positive.

"Matching the high insulin levels needed to reach glucagon cells with insulin injections is possible only with amounts that are excessive for other tissues," he said. "Peripherally injected insulin cannot accurately duplicate the normal process by which the body produces and distributes insulin. If these latest findings were to work in humans, injected insulin would no longer be necessary for people with type 1 diabetes."

*Dr. May-Yun Wang, assistant professor of internal medicine at UT Southwestern, and researchers from the Albert Einstein College of Medicine also contributed to the work.*

*The study was supported in part by the VA North Texas Health Care System, the American Diabetes Association and the National Institutes of Health.*

***http://www.eurekalert.org/pub_releases/2011-01/cshl-gaf012511.php***

## Genetic archaeology finds parts of our genome more closely related to orangutans than chimps

**January 26, 2011 – *In a study published online today in Genome Research (www.genome.org), in coordination with the publication of the orangutan genome sequence, scientists have presented the surprising finding that although orangutans and humans are more distantly related, some regions of our genomes are more alike than those of our closest living relative, the chimpanzee.***

The fossil record helped to establish evolutionary relationships and estimate divergence times of the primate branch leading to humans, but not until the advent of genome sequencing technology has it been possible to learn more detail about speciation times, genetic and phenotypic divergence times, and the genetic variation present in common ancestor species.

With the addition of the orangutan to the collection of sequenced primate genomes, an international group of scientists led by Mikkel Schierup and Thomas Mailund of Aarhus University in Denmark set out to shed light on these questions in primate evolution. "There remains signals of the distant past in DNA," said Mailund, "and our approach is to use such signals to study the genetics of our ancestors."

When a population "splits", the genetic variation they each inherit from the common ancestor will change over time as the populations diverge, possibly giving rise to two different species. Because humans, chimps,

and orangutans all have a common ancestor, it is possible that humans and orangutans may still share genetic variants that were later lost in more closely related primates.

Mailund and colleagues employed a mathematical framework to find regions of the orangutan genome where humans and orangutans are more closely related than humans and chimpanzees as a result of a phenomenon called incomplete lineage sorting (ILS). ILS can reveal information about the time of speciation events, as well as the genetic diversity of the ancestral species.

The study found ILS with orangutan and chimp in approximately 1% of the human genome. "[I]n about 0.5% of our genome, we are closer related to orangutans than we are to chimpanzees," Mailund said, "and in about 0.5%, chimpanzees are closer related to orangutans than us."

Schierup explained that because humans and orangutans split millions of years prior to the human/chimp split, the presence of ILS suggests that the ancestral species of human and chimps maintained high genetic diversity, in contrast to the genetic bottleneck humans are believed to have experienced following divergence from chimps.

As primates along the human lineage diverged, the genetic variation of the common ancestors disappeared long ago and was replaced by new variation. Schierup noted that studies such as this are critical for understanding genetic variation in common ancestors that would be missed by examining population genetics of present day species.

*Scientists from Aarhus University (Aarhus, Denmark) and the University of Wisconsin (Madison, WI) contributed to this study. This work was supported by the Danish Natural Sciences Research Council.*

***http://www.newscientist.com/article/dn20031-plastic-artificial-retina-is-a-hit-with-nerve-cells.html***

## Plastic artificial retina is a hit with nerve cells

*** 11:57 26 January 2011 by Duncan Graham-Rowe**

***Light-sensitive plastic might be key to repairing damaged retinas.***

Creating neuro-prosthetic devices such as retinal implants is tricky because biological tissue doesn't mix well with electronics. Metals and inorganic semiconductor materials can adversely affect the health or function of nerve cells, says Fabio Benfenati at the Italian Institute of Technology in Milan. And over time the body's natural defences can be incredibly hostile and corrosive to such materials.

The emergence of flexible, organic semiconductor materials now offers an alternative. To test them, Benfenati and colleagues seeded nerve cells onto the surface of a light-sensitive semiconducting polymer similar to those used in some solar cells. The cells grew into extensive networks containing thousands of neurons. "We have proved that the materials are highly biocompatible," says Benfenati.

What's more, the presence of the cells did not interfere with the optical properties of the polymer. The team were able to use the neuron-coated polymer as an electrode in a light-driven electrolytic cell.

**Artificial colour vision**

When short pulses of light were aimed at specific sections of the polymer, only local neurons fired, suggesting the material has the spatial selectivity needed for artificial retinas, says Benfenati.

"It's very elegant science," says Robert Greenberg, whose company Second Sight is close to receiving clinical approval for its retinal prosthesis. But Greenberg questions whether the electrical currents generated would be sufficient to stimulate nerve cells in the eye.

It's still too early to tell, says Benfenati. But he thinks the new material is worth further study, because of another benefit. It can be tuned to respond only to specific wavelengths of light, raising the prospect of creating artificial colour vision, he says. *Journal reference: Nature Communications, DOI: 10.1038/ncomms1164*

***http://www.bbc.co.uk/news/science-environment-12240549***

## 'Life chemicals' may have formed around far-flung star

**By Jason Palmer Science and technology reporter, BBC News**

***There is now even more evidence that life on Earth may have been seeded by material from asteroids or comets.***

Prior research has shown how amino acids - the building blocks of life - could form elsewhere in the cosmos.

These molecules can form in two versions, but life on Earth exclusively uses just one of them.

Now an Astrophysical Journal Letters paper shows how conditions around a far-flung star could favour the formation of one type over another.

Amino acids are corkscrew-shaped molecules that can form twisted to the left or right, and chemistry does not inherently favour one corkscrew direction over another. But without exception, life on Earth makes use of the left-handed version. A famous experiment in 1952 showed how a spark across a soup of simple chemicals representing the primordial Earth could form amino acids - but like many that followed, it formed equal numbers of left- and right-handed types.

The idea that amino acids might have been delivered to the early Earth by meteorites - themselves formed from asteroids or comets - provided another route, and studies of meteorites have even shown excesses of left-handed amino acids.

Last week, Nasa astrobiologist Daniel Glavin and his colleagues followed up on that finding, saying their research showed that a wide variety of meteor types might play host to excesses of this sort.

What remained was to determine the mechanism by which the left-handed version could be preferentially produced in the cosmos, to be picked up and ultimately delivered to Earth.

**Circular argument**

Now, Uwe Meierhenrich of University of Nice Sophia Antipolis and colleagues have found one way that this "symmetry breaking" may happen. They started with chunks of icy material that included several simple molecules: water, methanol, and ammonia - ingredients from which amino acids can be made. They then exposed the ices to ultraviolet light of a very particular type.

Light has a polarisation, which is to say that light rays oscillate along a given direction - say, up and down, or left and right. While we can't see this effect directly, it is apparent in polarising sunglasses, which block reflected light that tends to be polarised along the left-and-right direction. The light used by the researchers, by contrast, was what is known as circularly polarised. Rather than along a single direction, the polarisation traces out a corkscrew shape. Light in the regions around a forming star is known to become circularly polarised like this as it passes through vast clouds of dust grains that are aligned by magnetic fields.

The experiments showed that the circularly polarised light led to the formation of both left- and right-handed amino acids - but there were slightly over a percent more of the left-handed version.

That is the level of excess that Dr Glavin and his colleagues have found in meteorites found on Earth - and the mechanism is a compelling fact in the case for an extraterrestrial origin for Earth's first amino acids.

"This excess is pretty cool," Dr Glavin told BBC News. "You've got to break the symmetry somehow, this is critical. But how do you break it? That's one of the most important questions: did life just randomly choose one type over another? It's starting to look like Nature helped a bit."

However, Dr Glavin noted that these molecules can swap their forms, and that an unequal mixture of the two types will settle out to an equal mixture in time, a process called racemisation. "These are exactly the kinds of experiments we need to be doing but we do need to keep the big picture in mind," he said.

That is, he said, to further shore up the idea that life on Earth started with a delivery of extraterrestrial ingredients, it still remains to pin down the mechanism by which the unequal mixtures can be preserved for the long journey from far-flung stars.

***http://www.newscientist.com/article/dn20035-lost-islands-of-the-crows-revealed-in-dna-study.html***

## Lost islands of the crows revealed in DNA study

*** 16:30 26 January 2011 by Jeff Hecht**

***Islands are generally thought of as the Hotel Californias of evolution: once immigrant species evolve to fit the less competitive local ecology, they can never leave. Every so often, a species somehow manages to escape back to the more-diverse mainland, but now evolutionary biologists have discovered that a whole major bird family once did so too.***

They've found the DNA signature of the common ancestor of all of the world's crows from the time it checked into an island resort north of Australia about 30 million years ago.

Highly vocal and intelligent, crows are classed among the songbirds, or Passeri, despite not being noted for their singing. The Passeri are a large group which appeared in what is now Australia soon after the death of the non-avian dinosaurs at the end of the Mesozoic, some 65 million years ago. The songbirds remained confined to Australia for many millions of years, and the core corvids – a group of some 700 species now including crows, ravens and jays – were the first to split from the main group. How they spread around the world, however, had been unclear.

Knud Jønsson, now at the Natural History Museum of Denmark in Copenhagen, set out to unravel the history of crows for his doctoral dissertation. By building a family tree of the world's corvids based on comparisons of DNA sequences and anatomy, and their present geographic distribution, he traced their origins to New Guinea, several hundred kilometres north of Australia, about 30 million years ago.

**The last of Australia**

However, 30 million years ago New Guinea did not exist in its current extensive form – some 786,000 square kilometres in area. It was instead a newly emerged chain of limestone islands called the proto-Papuan archipelago, fringing the Australo-Papuan tectonic plate.

As long as Australia was a long way from other land, any bird that flew far from the continent would have died at sea. But after the proto-Papuan archipelago emerged, "birds that crossed ocean barriers would find new,

under-exploited land masses which they could successfully colonise", says Jønsson. There they evolved to thrive in open environments, spread across the islands, and eventually dispersed around the world. Other songbirds didn't follow until millions of years later, when Australia drew closer to other land.

The corvids' spread around the world shows that islands are not dead ends, with their species doomed to extinction. Instead, the proto-Papuan archipelago was an "evolutionary cauldron" brewing species that could successfully colonise the whole world, says Jønsson.

*Journal reference: Proceedings of the National Academy of Sciences, DOI: 10.1073/pnas.1018956108*

***http://www.eurekalert.org/pub_releases/2011-01/uoa-tsd012711.php***

## Test shows dinosaurs survived mass extinction by 700,000 years

***University of Alberta researchers determined that a fossilized dinosaur bone found in New Mexico confounds the long established paradigm that the age of dinosaurs ended between 65.5 and 66 million years ago.***

The U of A team, led by Larry Heaman from the Department of Earth and Atmospheric Sciences, determined the femur bone of a hadrosaur as being only 64.8 million years old. That means this particular plant eater was alive about 700,000 years after the mass extinction event many paleontologists believe wiped all non-avian dinosaurs off the face of earth, forever.

Heaman and colleagues used a new direct-dating method called U-Pb (uranium-lead) dating. A laser beam unseats minute particles of the fossil, which then undergo isotopic analysis. This new technique not only allows the age of fossil bone to be determined but potentially can distinguish the type of food a dinosaur eats. Living bone contains very low levels of uranium but during fossilization (typically less than 1000 years after death) bone is enriched in elements like uranium. The uranium atoms in bone decay spontaneously to lead over time and once fossilization is complete the uranium-lead clock starts ticking. The isotopic composition of lead determined in the hadrosaur's femur bone is therefore a measure of its absolute age.

Currently, paleontologists date dinosaur fossils using a technique called relative chronology. Where possible, a fossil's age is estimated relative to the known depositional age of a layer of sediment in which it was found or constrained by the known depositional ages of layers above and below the fossil-bearing horizon. However, obtaining accurate depositional ages for sedimentary rocks is very difficult and as a consequence the depositional age of most fossil horizons is poorly constrained. A potential weakness for the relative chronology approach is that over millions of years geologic and environmental forces may cause erosion of a fossil-bearing horizon and therefore a fossil can drift or migrate from its original layer in the strata. The researchers say their direct-dating method precludes the reworking process.

It's widely believed that a mass extinction of the dinosaurs happened between 65.5 and 66 million years ago. It's commonly believed debris from a giant meteorite impact blocked out the Sun, causing extreme climate conditions and killing vegetation worldwide.

Heaman and his research colleagues say there could be several reasons why the New Mexico hadrosaur came from a line of dinosaurs that survived the great mass extinction events of the late Cretaceous period (KT extinction event). Heaman says it's possible that in some areas the vegetation wasn't wiped out and a number of the hadrosaur species survived. The researchers also say the potential survival of dinosaur eggs during extreme climatic conditions needs to be explored.

Heaman and his colleagues believe if their new uranium-lead dating technique bears out on more fossil samples then the KT extinction paradigm and the end of the dinosaurs will have to be revised.

***http://www.eurekalert.org/pub_releases/2011-01/uota-mml012611.php***

## Men more likely to stick with girlfriends who sleep with other women than other men

**AUSTIN, Texas—*Men are more than twice as likely to continue dating a girlfriend who has cheated on them with another woman than one who has cheated with another man, according to new research from a University of Texas at Austin psychologist.***

Women show the opposite pattern. They are more likely to continue dating a man who has had a heterosexual affair than one who has had a homosexual affair.

The study, published last month in the journal Personality and Individual Differences, provides new insight into the psychological adaptations behind men's desire for a variety of partners and women's desire for a committed partner. These drives have played a key role in the evolution of human mating psychology.

"A robust jealousy mechanism is activated in men and women by different types of cues — those that threaten paternity in men and those that threaten abandonment in women," says Jaime C. Confer, the study's lead author and a doctoral candidate in evolutionary psychology.

Confer conducted the study with her father, Mark D. Cloud, a psychology professor at Lock Haven University in Pennsylvania.

The researchers asked 700 college students to imagine they were in a committed romantic and sexual relationship with someone they've been dating for three months. They were then asked how they would respond to infidelity committed by the imagined partner.

Some participants were told their partners had been unfaithful with a man, others with a woman. Some were told their partners had an affair with one person, others with multiple partners. Some were told the infidelity happened once, others twice.

Regardless of the number of episodes or partners, the study found that:

* Overall, men demonstrated a 50 percent likelihood of continuing to date a partner who has had a homosexual affair and a 22 percent likelihood of staying with a woman after a heterosexual affair.

* Women demonstrated a 28 percent likelihood of continuing to date a boyfriend who has had a heterosexual affair and a 21 percent likelihood of staying with someone who has had a homosexual affair.

The findings suggest men are more distressed by the type of infidelity that could threaten their paternity of offspring. Men may also view a partner's homosexual affair as an opportunity to mate with more than one woman simultaneously, satisfying men's greater desire for more partners, the authors say.

"These findings are even more remarkable given that homosexuality attitude surveys show men have more negative attitudes toward homosexuality and to be less supportive of civil rights for same-sex couples than women. However, this general trend of men showing lower tolerance for homosexuality than women is reversed in the one fitness-enhancing situation—female homosexuality," say the authors.

Conversely, women objected to continuing a relationship following both types of affairs, but especially so for a boyfriend's homosexual affair. Such an affair may be seen as a sign of dissatisfaction with the current relationship and a prelude to possible abandonment, according to the authors.

Participants were also asked the outcomes of real-life infidelity experiences. Results mirrored those of the imagined infidelity scenarios: Men were significantly more likely than women to have ended their actual relationships following a partner's (presumably heterosexual) affair.

***http://www.physorg.com/news/2011-01-fox-prehistoric-friend.html***

## Was the fox prehistoric man's best friend?

**PhysOrg.com -** ***Early humans may have preferred the fox to the dog as an animal companion, new archaeological findings suggest.***

Researchers analysing remains at a prehistoric burial ground in Jordan have uncovered a grave in which a fox was buried with a human, before part of it was then transferred to an adjacent grave.

The University of Cambridge-led team believes that the unprecedented case points to some sort of emotional attachment between human and fox. Their paper, published today, suggests that the fox may have been kept as a pet and was being buried to accompany its master, or mistress, to the afterlife.

If so, it marks the first known burial of its kind and suggests that long before we began to hunt foxes using dogs, our ancestors were keeping them as pets - and doing so earlier than their canine relatives.

The cemetery, at Uyun-al-Hammam, in northern Jordan, is about 16,500 years old, which makes the grave 4,000 years older than the earliest known human-dog burial and 7,000 years earlier than anything similar here involving a fox.

Writing in the open-access journal, PLoS One, the researchers also suggest that this early example of human-animal burial may be part of a bigger picture of growing cultural sophistication that has typically been associated with the farming societies of the Neolithic era, thousands of years later.

Sadly for fox-lovers, however, the relationship between man and that particular beast was probably short-lived. The paper also says it is unlikely that foxes were ever domesticated in full and that, despite their early head start, their recruitment as a friendly household pet fell by the wayside in later millennia as their human masters took to the more companionable dog instead.

"The burial site provides intriguing evidence of a relationship between humans and foxes which predates any comparable example of animal domestication," Dr Lisa Maher, from the Leverhulme Centre for Human Evolutionary Studies, University of Cambridge, said.

"What we appear to have found is a case where a fox was killed and buried with its owner. Later, the grave was reopened for some reason and the human's body was moved. But because the link between the fox and human had been significant, the fox was moved as well, so that the person, or people, would still be accompanied by it in the afterlife."

The research focused on the contents of two particular graves at Uyun-al-Hammam, which is situated on an ancient river terrace in the small river valley of Wadi Ziqlab. The site has been one of major interest for archaeologists since the first graves were opened in 2005 because it provides a rich source of information about the so-called early Epipalaeolithic period, 16,500 years ago.

The Cambridge-led team spotted a connection between Grave I on the site and Grave VIII, which lies beside it but was only opened more recently. In the first, they identified the remains of two adults, probably a man and a woman. The man had been buried earlier than the woman, and alongside him were the skull and humerus of a fox, as well as other grave goods.

It was only when Grave VIII was opened, however, that the researchers found both human remains that may have belonged to the same man, and the skeletal remnants of what was, almost certainly, the same fox. The fox skeleton was complete apart from its skull and right humerus - which is exactly what they had already found in the adjacent grave. Further studies indicated that the remains were indeed those of a red fox.

The movement of the body parts is believed to be highly significant. If the human body is the same in both cases, then none of the other grave goods except the fox were considered worth moving, strongly suggesting that the fox had some sort of special relationship to the human. Other such cases are very rare. Many of the next earliest involve dogs, including one site in Israel where a woman was buried with her hand resting on a puppy, but even they are about 4,000 years younger than Uyun-al-Hammam.

"The very first evidence of dog domestication in the Near East involves a burial of a puppy with a human," Dr. Jay Stock, also from the Leverhulme Centre at the University of Cambridge, said. "It's easy to imagine that the similarly-sized fox was also viewed by prehistoric people as a potential companion in the same way. Clearly, it had significant social status."

Studies carried out on foxes suggest that they can be brought under human control, but that the process is not easy because they are skittish and timid by nature. Perhaps for that reason, the researchers suggest, dogs ultimately achieved "best friend" status among humans instead. *Provided by University of Cambridge*

***http://www.itnews.com.au/News/246346,physicists-call-for-alien-messaging-protocol.aspx***

## Physicists call for alien messaging protocol

**Liz Tay | Jan 28, 2011 12:50 PM**

***Framework for extraterrestrial communications proposed.***

Earth's previous attempts to contact intelligent, extraterrestrial life could be too disorganised or cryptic for non-human beings to decode, US physicists have reported. In a submission to the international journal, Space Policy, postgraduate astrophysicists Dimitra Atri, Julia DeMarines and Jacob Haqq-Misra suggested that a protocol be developed to improve the likelihood that messages would be understood.

The messaging to extraterrestrial intelligence protocol (METI, pdf) would include constraints and guidelines for signal encoding, message length, information content, the researchers wrote. It should also specify a transmission strategy, they said, suggesting a simple physical or mathematical language with the signal repeated regularly to avoid being overlooked as noise.

The researchers suggested transmissions use either 1.42 GHz or 4.46 GHz frequencies to coincide with radio frequencies commonly observed in nature, and assuming "modest technical capabilities" of an extraterrestrial receiver. Frequency, pulse and polarisation signal modulation techniques should also be considered to maximise the probability of detection, they said.

Noting that there were a few telescopes - including Arecibo in Puerto Rico - currently able to transmit messages at "planetary distances", the researchers called for a dedicated beacon to be established for conducting regular broadcasts. "This is a much longer-term ambition that will require significant international investment and cooperation," they wrote.

**The dangers of communication**

Last year, luminary physicist Stephen Hawking famously warned that Earth should avoid alien contact, since contact with hostile beings could be devastating for humanity.

Atri and his team argued that Earth had been emitting electromagnetic signals for more than a century, mostly as "unintended leakage from television, aviation, and telecommunication".

"An advanced civilization within a radius of 100 light years could detect our television shows and already know we are here, so there is little hope in concealing our location in space," they wrote.

Since 1974, humans have intentionally broadcast the numbers one through ten, atomic numbers of elements in DNA, graphics of a human, the solar system, and Arecibo, musical melodies, text messages, photographs and drawings. The researchers noted that messages had become increasingly "anthropocentric" and complex, which could make them more difficult for extraterrestrial listeners to decode and decipher.

"Modern technology allows for large amounts of data to be transmitted at moderate costs, but the broadcast of massive amounts of information assumes that the recipient extraterrestrials will be capable of comprehending a complex message," they wrote. "Given that we know very little about the nature of extraterrestrial civilizations, if they exist, we are likely to increase the probability of us successfully communicating to them if we use a message that the recipient is likely to understand."

Once developed, a METI protocol could be used to test communication across human cultural boundaries, the researchers wrote.

They suggested the establishment of a website through which members of the public could create sample messages that conformed to the protocol, and retrieve and attempt to decrypt messages by other users. "A METI protocol is needed in order for a unified and international effort to be made in messaging extraterrestrials," they concluded. "By carefully constructing a framework by which to write and send messages, we will optimize the quality of messages as they are broadcast and increase the probability that we are understood." The paper was expected to be published in the May or August issue of Space Policy.

***http://www.eurekalert.org/pub_releases/2011-01/uobc-ml012711.php***

## Mini-strokes leave 'hidden' brain damage: Vancouver Coastal Health and UBC Research

***Each year, approximately 150,000 Canadians have a transient ischemic attack (TIA), sometimes known as a mini-stroke. New research published today in Stroke, the journal of the American Heart Association shows these attacks may not be transient at all. They in fact create lasting damage to the brain.***

The stroke research team, led by Dr. Lara Boyd, physical therapist and neuroscientist with the Brain Research Centre at Vancouver Coastal Health and the University of British Columbia, studied 13 patients from the Stroke Prevention Clinic at Vancouver General Hospital and compared them against 13 healthy study participants. The TIA subjects had all experienced an acute episode affecting motor systems, but had symptoms resolved within 24 hours. The patients were studied within 14-30 days of their episode, and showed no impairment through clinical evaluation or standard imaging (CT or MRI). Participants then underwent a unique brain mapping procedure using transcranial magnetic stimulation (TMS) with profound results.

"What we found has never been seen before," says Dr. Boyd, who also holds the Canada Research Chair in Neurobiology of Motor Learning at UBC. "The brain mapping capabilities of the TMS showed us that TIA is actually causing damage to the brain that lasts much longer than we previously thought it did. In fact, we are not sure if the brain ever recovers."

In the TIA group, brain cells on the affected side of the brain showed changes in their excitability – making it harder for both excitatory and inhibitory neurons to respond as compared to the undamaged side and to a group of people with healthy brains. These changes are very concerning to the researchers as they show that TIA is likely not a transient event.

A transient ischemic attack is characterized as a brief episode of blood loss to the brain, creating symptoms such as numbness or tingling, temporary loss of vision, difficulty speaking, or weakness on one side of the body. Symptoms usually resolve quickly and many people do not take such an episode seriously. However, TIAs are often warning signs of a future stroke. The risk of a stroke increases dramatically in the days after an attack, and the TIA may offer an opportunity to find a cause or minimize the risk to prevent the permanent neurologic damage that results because of a stroke.

"These findings are very important," says Dr. Philip Teal, head of the Stroke Prevention Clinic at VGH and co-author of the study. "We know that TIA is a warning sign of future stroke. We treat every TIA as though it will result in a stroke, but not every person goes on to have a stroke. By refining this brain mapping technique, our hope is to identify who is most at risk, and direct treatment more appropriately."

The use of transcranial magnetic stimulation in examining the patterns of brain activation as they relate to motor learning after stroke has been a main focus of Dr. Boyd and her research lab.

The research team has recently received a Canadian Institutes for Health Research grant to continue their research in this area. "We know now that people may look and feel fine, and even standard imaging says they are fine, but they are not," says Jodi Edwards, PhD candidate in the School of Population and Public Health, UBC, lead author of the study, and member of Dr. Boyd's lab. "We want to know if the damage persists, if we can identify who is most at risk, and how we can most effectively target the damaged area for optimum treatment. We are extremely excited to continue to follow this work."

*This study was supported by awards from Canadian Institutes of Health Research, Michael Smith Foundation for Health Research, Vancouver Coastal Health Research Institute, and the Canada Research Chairs program.*

http://www.newscientist.com/article/dn20042-did-modern-humans-go-global-twice-as-early-as-thought.html

## Did modern humans go global twice as early as thought?

*** 19:00 27 January 2011 by Bob Holmes**

***Homo sapiens might have spread across the world much earlier than previously thought – and it was a favourable climate, not a sophisticated culture, that allowed them to go.***

Anatomically modern humans evolved in Africa about 200,000 years ago. Most palaeoanthropologists believe they stayed there for 140,000 years before migrating around the world, except for an abortive colonisation of what is now Israel about 120,000 years ago.

Genetic evidence suggests that modern humans finally moved out of Africa and into the Middle East about 60,000 years ago. From there, they quickly spread throughout Asia and Europe, outcompeting the indigenous populations of Homo erectus and Neanderthals. It had been assumed that it was the development of more sophisticated tools and culture that led to this exodus. But that assumption has been challenged thanks to an archaeological find at Jebel Faya in the United Arab Emirates.

**Arabian stone tools**

In the desert near the Straits of Hormuz, Hans-Peter Uerpmann of the University of Tubingen, Germany, and his colleagues have excavated stone tools that date from about 125,000 years ago.

The pattern of flaking on the stone tools, which is determined by how they are made, is distinct from that seen on tools made by the Neanderthals who were living further north at the time, and nothing like the tools made by Homo erectus. They are also distinct from the 120,000-year-old Israeli tools found 2000 kilometres to the north-west, suggesting they are not more evidence of that aborted migration event.

But they do look like the primitive tools made around the same time by early modern humans in eastern Africa, and so likely represent a previously unrecognised "out of Africa" migration, says team member Anthony Marks, an archaeologist now retired from Southern Methodist University in Dallas, Texas.

As such, the new tools suggest that Homo sapiens managed to travel across the forbidding Arabian peninsula about 60,000 years earlier than had been thought. That's the "first big step" towards global dominance, says Marks.

Moreover, this move to Arabia happened long before the development of the sophisticated stone tools that are typically associated with the first Homo sapiens outside Africa. This suggests that it wasn't cultural deficiencies that confined our ancestors to the African continent.

**Desert obstacles**

Instead, Uerpmann suggests the physical environment – in particular the Red Sea and the deserts of Arabia – may have been the obstacle to migration out of Africa.

That obstacle may have been less insurmountable 125,000 years ago, however. Around 130,000 years ago, sea levels were still low at the end of a glacial period, making the Red Sea smaller and easier to cross. Soon after, interglacial warming brought monsoon rains to Arabia, transforming the deserts into eminently crossable savannahs.

Chris Stringer, a palaeoanthropologist at the Natural History Museum in London, notes that it is still unclear whether the new finds record the activity of the Homo sapiens that ultimately spread across the rest of the Old World, or just another aborted migration attempt. It is possible that the globally successful migration didn't happen until 60,000 years ago, he says.

If the stone tools were made by the Homo sapiens that went on to conquer the world, it suggests that the global migration may have happened slower than thought. "Our work essentially doubles the length of time that Homo sapiens had to get to these various places," says Marks. "I'm much more comfortable with that."

*Journal reference: Science, DOI: 10.1126/science.1199113.*

http://www.newscientist.com/blogs/onepercent/2011/01/xl1-electric-super-car.html

## VW's diesel hybrid: most efficient car on the planet?

**Niall Firth, technology editor**

***In a world of soaring fuel prices it's certainly a smart move.***

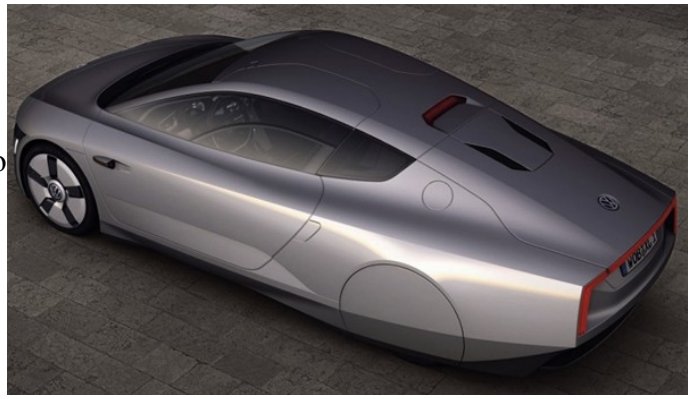
While Volkswagen's new XL1 "Super Efficient Vehicle" might look like a "futuristic" concept car designed sometime in the late 1980s, its figures are undoubtedly impressive.

Unveiled at the Qatar motor show on Tuesday night, the XL1 claims an incredible fuel consumption of just 0.9 litres per 100 kilometres (equivalent to 239 miles per gallon). VW also says it emits just 24 grams of carbon dioxide per kilometre.

The remarkable figures are all down to a combination of a 0.8-litre diesel engine and an electric motor couple with clever weight-saving design and superior aerodynamics.

While these do not produce a huge amount of power, the car's carbon-fiber body means it weighs just 795 kilograms, allowing it to accelerate from 0 to 100 km/h in 11.9 seconds. Not bad going for a hybrid.

The XL1's "unique" stylings mean that it only seats two passengers but its aerodynamic profile has been sculpted so that it can boast an impressive 0.186 drag coefficient. VW says it plans to start production of the XL1 by 2013, but the German car manufacturer is not the only big gun looking to exploit the resurgence in interest in electric cars.



**(Image: VW)**

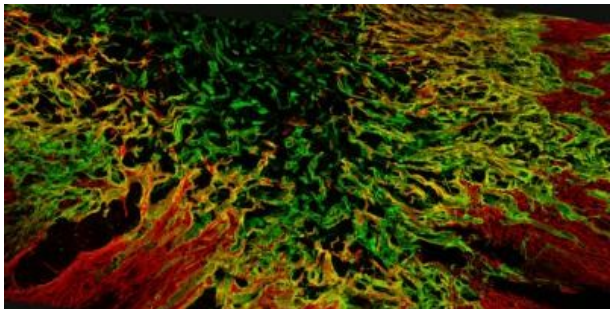
Electric vehicles dominated proceedings at the recent Detroit car show, scooping most of the top awards, and Audi's R8 E-Tron all-electric supercar wowed the crowds at CES this year.

***http://www.physorg.com/news/2011-01-cancer-drug-aids-cell-regeneration.html***

## Cancer drug aids cell regeneration after spinal cord injury

### *Cancer drug aids the regeneration of spinal cord injuries*

In a study published today in Science (e-publication ahead of print), a global research team reports that the cancer drug Taxol (Paclitaxel) promotes the regeneration of injured nerve cells in the central nervous system (CNS) after spinal cord injury. Scientists from the Max Planck Institute of Neurobiology in Germany and the Kennedy Krieger Institute's International Center for Spinal Cord Injury in Maryland, together with colleagues at the University of Utrecht in the Netherlands and University of Miami in Florida, found that the drug reduces the major obstacles to neural cell repair in the spinal cord of injured rats.



***The scar tissue creates a barrier for growing nerve cells in spinal cord injuries. Scientists have now found a way to render this cell wall more permeable for regenerating nerve cells.*** **Credit: Max Planck Institute of Neurobiology / Bradke & Hellal**

After a spinal cord injury a number of factors are known to halt the regeneration of nerve cells, including a poor capacity of neurons to grow and the development of scar tissue. Microtubules, small protein tubes which compose the cells' cytoskeleton, are jumbled in an injured CNS nerve cell, preventing the regrowth of cells. Concurrently, neural tissue is lost and a strong scar tissue develops, which creates a barrier for regeneration of the severed nerve cells.

Scientists found that Taxol has a dual role in spinal cord repair. It stabilizes the microtubule so that the injured nerve cells regain their ability to grow. Interestingly, the same drug prevents the production of inhibitory substances in the scar tissue.

The scar tissue, though reduced, will still develop at the site of injury and carrying out its protective function; yet growing nerve cells are now better able to cross this barrier.

In this study, scientists supplied Taxol to the rats via a miniature pump at the injury site immediately after a partial spinal cord lesion. Within a few weeks the animals showed significant improvement in their movements.

"The drug essentially reorganizes the cells' microtubules allowing them to ignore 'stop signs' and to regrow through diminished scar tissue," said Dr. Andres Hurtado, study author and research scientist in the International Center for Spinal Cord Injury at Kennedy Krieger Institute. "It is a breakthrough for the cells and it puts us on a very promising path."

As a clinically approved drug for cancer treatment, Taxol has many advantages, primarily that much is already known about its interactions with the human body, which can help to accelerate the path to human clinical trials. The drug can also be applied directly at the spinal cord injury site, requiring a lower dose. Further, since the drug dosage needed is far less than what is used in cancer therapy, it is likely to have lower side effects. However, the scientists caution that more basic research is needed before clinical trials, including studying whether Taxol is as effective when applied a few months post-injury. *Provided by Kennedy Krieger Institute*

http://www.physorg.com/news/2011-01-gene-relocation-key-evolutionary-bacteria.html

## Gene 'relocation' key to most evolutionary change in bacteria

### *Gene 'relocation' key to most evolutionary change in bacteria*

(PhysOrg.com) -- In a new study, scientists at the University of Maryland and the Institut Pasteur show that bacteria evolve new abilities, such as antibiotic resistance, predominantly by acquiring genes from other bacteria.

The researchers new insights into the evolution of bacteria partly contradict the widely accepted theory that new biological functions in bacteria and other microbes arise primarily through the process of gene duplication within the same organism. Their just released study will be published in the open-access journal PLoS Genetics on January 27.

Microbes live and thrive in incredibly diverse and harsh conditions, from boiling or freezing water to the human immune system. This remarkable adaptability results from their ability to quickly modify their repertoire of protein functions by gaining, losing and modifying their genes. Microbes were known to modify genes to expand their repertoire of protein families in two ways: via duplication processes followed by slow functional specialization, in the same way as large multicellular organisms like us, and by acquiring different genes directly from other microbes. The latter process, known as horizontal gene transfer, is notoriously conspicuous in the spread of antibiotic resistance, turning some bacteria into drug-resistant 'superbugs' such as MRSA (methicillin-resistant Staphylococcus aureus), a serious public health concern.

The researchers examined a large database of microbial genomes, including some of the most virulent human pathogens, to discover whether duplication or horizontal gene transfer was the most common expansion method. Their study shows that gene family expansion can indeed follow both routes, but unlike in large multicellular organisms, it predominantly takes place by horizontal transfer.

First author Todd Treangen, a postdoctoral researcher in the University of Maryland Center for Bioinformatics and Computational Biology and co-author Eduardo P. C. Rocha of the Institut Pasteur conclude that because microbes invented the majority of life's biochemical diversity -- from respiration to photosynthesis --, "the study of the evolution of biology systems should explicitly account for the predominant role of horizontal gene transfer in the diversification of protein families."

*More information: "Horizontal Transfer, Not Duplication, Drives the Expansion of Protein Families in Prokaryotes," PLoS Genetics, Todd J. Treangen and Eduardo P. C. Rocha. doi:10.1371/journal.pgen.1001284 Provided by University of Maryland*

http://www.eurekalert.org/pub_releases/2011-01/chla-rda012811.php

## Researchers discover age of onset of puberty predicts adult osteoporosis risk

### *Later puberty results in lower bone mass and increases risk of fracture*

LOS ANGELES – A team of researchers led by Vicente Gilsanz, MD, PhD, director of Clinical Imaging at The Saban Research Institute of Children's Hospital Los Angeles, determined that the onset of puberty was the primary influence on adult bone mineral density, or bone strength. Length of puberty did not affect bone density. Reduced bone mineral density leads to osteoporosis, resulting in bones becoming increasingly brittle and at risk for fracture. Osteoporosis is a significant public health issue with the cost of treatment in 2010 estimated at $10 billion. This condition affects 55% of Americans aged 50 and older.

The Bone Mineral Density in Childhood Study is an ongoing multicenter study examining bone development in healthy children and teenagers of both sexes and ethnic groups in the United States. For this analysis, the investigators studied 78 girls and 84 boys who had just entered puberty, until they reached sexual maturity.

"Puberty has a significant role in bone development," explained Dr. Gilsanz. "During this time, bones lengthen and increase in density. At the end of puberty the epiphyseal plates close, terminating the ability of the bones to lengthen. When this occurs, the teenager has reached their maximum adult height and peak bone mass. We found that early puberty was associated with greater bone mass while later puberty resulted in less."

Adolescents with short stature sometimes undergo medical intervention to delay puberty in an effort to achieve greater height. This study indicates that prolonging the growth period by delaying puberty may have unexpected consequences in later life.

The 2000 National Institutes of Health Consensus Development Conference on Osteoporosis Prevention, Diagnosis, and Therapy identified bone mineral deposition during adolescence as a critical determinant of osteoporosis risk later in life. The care of patients with osteoporosis is difficult, and most therapies increase bone density by small amounts yet requires long periods of treatment. In contrast, during puberty large increases in bone density occur over a short period of time.

Given that the rate of decline of bone mass in adulthood is approximately 1% to 2% each year, a 10% to 20% increase in bone density resulting from a natural early puberty corresponds to an additional 10 to 20 years of protection against the normal age-related decline in bone strength.

*Collaborators on this study included Tishya Wren, PhD, and James Chalfant, BS, Children's Hospital Los Angeles; John Shepherd, PhD, University of California, San Francisco; Heidi Kalkwarf, PhD, Cincinnati Children's Medical Center; Babette Zemel, PhD, Children's Hospital of Philadelphia; Joan Lappe, PhD, Creighton University; Sharon Oberfield, MD, Columbia University; and Karen Winer, MD, National Institute of Child Health and Development. The article was published in the Journal of Pediatrics.*

***http://www.scientificamerican.com/article.cfm?id=arctic-current-warmer-than-for-2000***

## Arctic current warmer than for 2,000 years: study

***A North Atlantic current flowing into the Arctic Ocean is warmer than for at least 2,000 years in a sign that global warming is likely to bring ice-free seas around the North Pole in summers, a study showed.***

**By Alister Doyle, Environment Correspondent**

OSLO (Reuters) - A North Atlantic current flowing into the Arctic Ocean is warmer than for at least 2,000 years in a sign that global warming is likely to bring ice-free seas around the North Pole in summers, a study showed.

Scientists said that waters at the northern end of the Gulf Stream, between Greenland and the Norwegian archipelago of Svalbard, averaged 6 degrees Celsius (42.80F) in recent summers, warmer than at natural peaks during Roman or Medieval times.

"The temperature is unprecedented in the past 2,000 years," lead author Robert Spielhagen of the Academy of Sciences, Humanities and Literature in Mainz, Germany, told Reuters of the study in Friday's edition of the journal Science.

The summer water temperatures, reconstructed from the makeup of tiny organisms buried in sediments in the Fram strait, have risen from an average 5.2 degrees Celsius (41.36F) from 1890-2007 and about 3.4C (38.12F) in the previous 1,900 years.

The findings were a new sign that human activities were stoking modern warming since temperatures are above past warm periods linked to swings in the sun's output that enabled, for instance, the Vikings to farm in Greenland in Medieval times.

"We found that modern Fram Strait water temperatures are well outside the natural bounds," Thomas Marchitto, of the University of Colorado at Boulder, one of the authors, said in a statement.

The Fram strait is the main carrier of ocean heat to the Arctic.

**ICE-FREE OCEAN**

The authors wrote that the warming temperatures "are presumably linked to the Arctic amplification of global warming" and that the warming "is most likely another key element in the transition to a future ice-free Arctic Ocean."

Ice on the Arctic Ocean shrank to its lowest on record in 2007 and many experts expect the ocean will be ice-free in summers in coming decades, a threat to the hunting livelihoods of indigenous peoples and to creatures such as polar bears.

The Arctic is heating up twice as fast as the global average as part of a trend the U.N. panel of climate scientists blames on a build-up of greenhouse gases from mankind's use of fossil fuels in power plants, factories and cars.

The shrinking of reflective ice and snow in the Arctic region exposes water or ground which are darker colored and so soak up more heat from the sun, amplifying warming. *(Editing by Ralph Boulton)*

***http://news.discovery.com/archaeology/human-ancestors-trees-bipedal-110128.html***

## Humans Left Trees 4.2 Million Years Ago

***Wrist bones of human ancestors reveal when humans switched from living in trees to on the ground.***

**By Jennifer Viegas Fri Jan 28, 2011 12:13 PM ET**

Early human ancestors stopped swinging in trees and started walking on the ground sometime between 4.2 and 3.5 million years ago, according to a new study.

This key moment, when our ancestors became anatomically and behaviorally less ape-like, coincides with increased cooling, more defined seasonality, and a grassland growth spurt. All transformed former forest habitats into more varied ones, forcing our very early relatives to change their ways.

"With the trees being farther apart, it became energetically advantageous for hominids to cross the gaps bipedally," said Gabriele Macho, lead author of the study that was published in the latest issue of Folia Primatologica..

Macho, a paleoanthropologist at the Catalan Institute of Paleontology in Barcelona, and his colleagues made the determinations after analyzing wrist bones from two early hominid relatives: Australopithecus anamensis and Australopithecus afarensis (also known as the "Lucy" fossil). The former species is 600,000 years older than the latter and is believed to be its ancestor.

The researchers performed high-resolution CT scans of the central wrist bones, called capitates, of a modern orangutan, gorilla, chimpanzee and person to see how these bones differ between arboreal animals and more terrestrial ones. They found that full-time tree swingers and dwellers load more force on the little finger side of their hands while terrestrial individuals load the thumb side more.

"Try it out yourself," Macho said. "Hold on to a pole or tree with a medium-sized diameter and observe where on the hand and wrist the greatest pressure is. You'll feel that the thumb side doesn't assume a great role."

The scientists observed that the Australopithecus anamensis wrist bones exhibited pressure loads associated with modern arboreal animals. The analyzed Australopithecus afarensis bones conversely showed stress loads comparable to those of more terrestrial species, including modern humans.

The researchers concluded that the important shift in early hominid lifestyle happened around the time when A. afarensis first emerged. It's likely that Australopithecus anamensis walked on the ground at times too, but Macho points out that "form follows function." Other evidence from the early human fossil record supports that major changes took place at about 4.2 million years ago.

Macho explained, "We know from cranio-dental remains that they also broadened their dietary niches and were no longer soft fruit eaters, as the last common ancestor is assumed to have been."

Carol Ward, a professor of integrative biology at the University of Missouri, thinks the new study is "important and highlights the need for more careful and detailed analysis of the functional anatomy of A. anamensis."

Ward told Discovery News that for decades, the earliest known australopith was A. afarensis, but the more recently unearthed A. anamensis permits comparison studies to highlight differences between the likely related species.

Robin Crompton, a professor of musculoskeletal biology at the University of Liverpool, said the new study took a "refreshing approach," benefited by technology.

"The burgeoning power of computers allows us to model mechanical performance of fossil bones and whole skeletons, and effectively 'reverse-engineer' them," Crompton said.

He hopes the findings will inspire future research to solve puzzles these new findings pose. For example, Crompton asked, "Could it be that, like humans, the hand of the later species is actually more adapted for tool manufacture and use, while other features of the upper limb remain adapted to climbing?"

***http://www.physorg.com/news/2011-01-cows-bad-spuds.html***

## Study: Cows done in by bad spuds

**(PhysOrg.com) --** ***Anyone taking the recent, mysterious deaths of 200 steers in a Portage County, Wis., feedlot as a sign of the apocalypse can rest easy. The cows, according to the Wisconsin Veterinary Diagnostic Laboratory, were done in by bad spuds.***

Specifically, the cows were poisoned by a toxin found in moldy sweet potatoes, which apparently were mixed in with potato waste fed to the animals. Tests on feed samples revealed the presence of ipomeanol, a mycotoxin found in moldy sweet potatoes, says Peter Vanderloo, associate director of the lab.

"Based on history, clinical signs, changes in tissue and test results from our lab and a referral laboratory, it is likely that a mycotoxin from moldy sweet potato was a major factor in the disease and deaths of these steers," Vanderloo explains.

Sweet potato waste was a major component of the animals' diet at the time of the Jan. 14 incident, he notes. It is a common practice in agriculture to feed animals food that cannot be used for human consumption. In this case, the potatoes were never in the human food supply chain, Vanderloo explains, and there is no risk to human heath.

It was first suspected that a virus or other pathogen might have been responsible, Vanderloo says, because the animals exhibited symptoms consistent with pneumonia. However, laboratory tests found no evidence of any of the major viral pathogens that could cause a respiratory disease such as pneumonia. "None of the major respiratory pathogens of cattle were identified in the samples provided to the lab."

The lab looked for bovine herpesvirus, bovine viral diarrhea virus, bovine respiratory synctial virus and corona virus and found no evidence for those or any other pathogens, according to Vanderloo.

The deaths of the Wisconsin cattle, reported shortly after other mass die-offs of birds and fish, was reported widely and fueled wild speculation as to the cause, linking the deaths to everything from the end of the Mayan calendar to the second coming and the apocalypse.

The Wisconsin Veterinary Diagnostic Laboratory, established in 1938, is the primary state laboratory providing diagnostic services and disease surveillance tests for farmers and others to detect a wide variety of animal diseases and pathogens that affect domesticated and wild animals. *Provided by University of Wisconsin-Madison*

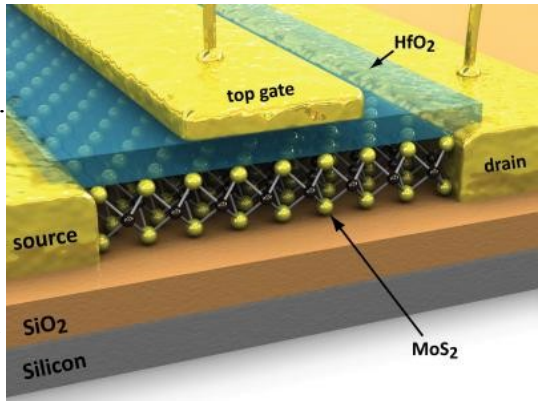
http://www.eurekalert.org/pub_releases/2011-01/epfd-nta012811.php

## New transistors: An alternative to silicon and better than graphene

***Smaller and more energy-efficient electronic chips could be made using molybdenite, a material developed in Switzerland***

Smaller and more energy-efficient electronic chips could be made using molybdenite. In an article appearing online January 30 in the journal Nature Nanotechnology, EPFL's Laboratory of Nanoscale Electronics and Structures (LANES) publishes a study showing that this material has distinct advantages over traditional silicon or graphene for use in electronics applications.

A discovery made at EPFL could play an important role in electronics, allowing us to make transistors that are smaller and more energy efficient. Research carried out in the Laboratory of Nanoscale Electronics and Structures (LANES) has revealed that molybdenite, or MoS2, is a very effective semiconductor. This mineral, which is abundant in nature, is often used as an element in steel alloys or as an additive in lubricants. But it had not yet been extensively studied for use in electronics.




***This is a digital model showing how molybdenite can be integrated into a transistor.*** **EPFL**

**100,000 times less energy**

"It's a two-dimensional material, very thin and easy to use in nanotechnology. It has real potential in the fabrication of very small transistors, light-emitting diodes (LEDs) and solar cells," says EPFL Professor Andras Kis, whose LANES colleagues M. Radisavljevic, Prof. Radenovic et M. Brivio worked with him on the study. He compares its advantages with two other materials: silicon, currently the primary component used in electronic and computer chips, and graphene, whose discovery in 2004 earned University of Manchester physicists André Geim and Konstantin Novoselov the 2010 Nobel Prize in Physics.

One of molybdenite's advantages is that it is less voluminous than silicon, which is a three-dimensional material. "In a 0.65-nanometer-thick sheet of MoS2, the electrons can move around as easily as in a 2-nanometer-thick sheet of silicon," explains Kis. "But it's not currently possible to fabricate a sheet of silicon as thin as a monolayer sheet of MoS2." Another advantage of molybdenite is that it can be used to make transistors that consume 100,000 times less energy in standby state than traditional silicon transistors. A semi-conductor with a "gap" must be used to turn a transistor on and off, and molybdenite's 1.8 electron-volt gap is ideal for this purpose.

**Better than graphene**

In solid-state physics, band theory is a way of representing the energy of electrons in a given material. In semi-conductors, electron-free spaces exist between these bands, the so-called "band gaps." If the gap is not too small or too large, certain electrons can hop across the gap. It thus offers a greater level of control over the electrical behavior of the material, which can be turned on and off easily.

The existence of this gap in molybdenite also gives it an advantage over graphene. Considered today by many scientists as the electronics material of the future, the "semi-metal" graphene doesn't have a gap, and it is very difficult to artificially reproduce one in the material.

***For more information: Nature Nanotechnology: http://www.nature.com/nnano/index.html Direct link to the article: http://dx.doi.org/10.1038/nnano.2010.279***

http://www.eurekalert.org/pub_releases/2011-01/ind-ado012811.php

## A deficiency of dietary omega-3 may explain depressive behaviors

***Neuroscience of nutrition***

How maternal essential fatty acid deficiency impact on its progeny is poorly understood. Dietary insufficiency in omega-3 fatty acid has been implicated in many disorders. Researchers from Inserm and INRA and their collaborators in Spain collaboration, have studied mice fed on a diet low in omega-3 fatty acid. They discovered that reduced levels of omega-3 had deleterious consequences on synaptic functions and emotional behaviours. Details of this work are available in the online version of the journal Nature neuroscience, which can be accessed at: http://dx.doi.org/10.1038/nn.2736

In industrialized nations, diets have been impoverished in essential fatty acids since the beginning of the 20th century. The dietary ratio between omega-6 polyunsaturated fatty acid and omega-3 polyunsaturated fatty acid omega-3 increased continuously over the course of the 20th century. These fatty acids are "essential" lipids because the body cannot synthesize them from new. They must therefore be provided through food and their dietary balance is essential to maintain optimal brain functions.

Olivier Manzoni (Head of Research Inserm Unit 862, "Neurocentre Magendie", in Bordeaux and Unit 901 "Institut de Neurobiologie de la Méditerranée" in Marseille), and Sophie Layé (Head of Research at INRA Unit 1286, "Nutrition et Neurobiologie Intégrative" in Bordeaux) and their co-workers hypothesized that chronic malnutrition during intra-uterine development, may later influence synaptic activity involved in emotional behaviour (e.g. depression, anxiety) in adulthood.

To verify their hypotheses, the researchers studied mice fed a life-long diet imbalanced in omega-3 and omega-6 fatty acids. They found that omega-3 deficiency disturbed neuronal communication specifically. The researchers observed that only the cannabinoid receptors, which play a strategic role in neurotransmission, suffer a complete loss of function. This neuronal dysfunction was accompanied by depressive behaviours among the malnourished mice. Among omega-3 deficient mice, the usual effects produced by cannabinoid receptor activation, on both the synaptic and behavioural levels, no longer appear. Thus, the CB1R receptors lose their synaptic activity and the antioxidant effect of the cannabinoids disappears.

Consequently, the researchers discovered that among mice subjected to an omega-3 deficient dietary regime, synaptic plasticity, which is dependent on the CB1R cannabinoid receptors, is disturbed in at least two structures involved with reward, motivation and emotional regulation: the prefrontal cortex and the nucleus accumbens. These parts of the brain contain a large number of CB1R cannabinoid receptors and have important functional connections with each other.

"Our results can now corroborate clinical and epidemiological studies which have revealed associations between an omega-3/omega-6 imbalance and mood disorders", explain Olivier Manzoni and Sophie Layé. "To determine if the omega-3 deficiency is responsible for these neuropsychiatric disorders additional studies are, of course, required".

In conclusion, the authors estimate that their results provide the first biological components of an explanation for the observed correlation between omega-3 poor diets, which are very widespread in the industrialized world, and mood disorders such as depression.

*For more information*

*Source « Nutritional Omega-3 deficiency abolishes endocannabinoid mediated neuronal functions »*

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