http://www.bbc.co.uk/news/health-17952797

Range of brain diseases could be treated by single drug

The tantalising prospect of treating a range of brain diseases, such as Alzheimer's and Parkinson's, all with the same drug, has been raised by UK researchers.

By James Gallagher Health and science reporter, BBC News

In a study, published in Nature, they prevented brain cells dying in mice with prion disease. It is hoped the same method for preventing brain cell death could apply in other diseases. The findings are at an early stage, but have been heralded as "fascinating". Many neuro-degenerative diseases result in the build-up of proteins which are not put together correctly - known as misfolded proteins. This happens in Alzheimer's, Parkinson's and Huntington's as well as in prion diseases, such as the human form of mad cow disease.

Turn off

Researchers at the University of Leicester uncovered how the build-up of proteins in mice with prion disease resulted in brain cells dying. They showed that as misfolded protein levels rise in the brain, cells respond by trying to shut down the production of all new proteins. It is the same trick cells use when infected with a virus. Stopping production of proteins stops the virus spreading. However, shutting down the factory for a long period of time ends up killing the brain cells as they do not produce the proteins they actually need to function.

The team at the Medical Research Council laboratory in Leicester then tried to manipulate the switch which turned the protein factory off. When they prevented cells from shutting down, they prevented the brain dying. The mice then lived significantly longer. Each neuro-degenerative disease results in a unique set of misfolded proteins being produced, which are then thought to lead to brain cells dying.

Prof Giovanna Mallucci told the BBC: "The novelty here is we're just targeting the protein shut-down, we're ignoring the prion protein and that's what makes it potentially relevant across the board." The idea, which has not yet been tested, is that if preventing the shut down protects the brain in prion disease - it might work in all diseases that have misfolded proteins.

Prof Mallucci added: "What it gives you is an appealing concept that one pathway and therefore one treatment could have benefits across a range of disorders. "But the idea is in its early stages. We would really need to confirm this concept in other diseases."

'Fascinating'

The study has been broadly welcomed by other scientists although many point out that the research is in its infancy. Professor of Molecular Neurobiology at King's College London, Roger Morris, said it was a "breakthrough in understanding what kills neurons". He added: "There are good reasons for believing this response, identified with prion disease, applies also to Alzheimer's and other neuro-degenerative diseases."And because it is such a general response, we already have some drugs that inhibit this response."

Prof Andy Randall, from the University of Bristol, said: "This is a fascinating piece of work. "It will be interesting to see if similar processes occur in some of the common diseases with such deposits, for example Alzheimer's and Parkinson's disease. "Furthermore, if this is the case, can modulating this same pathway be a route to new therapeutic approaches in these more prevalent conditions that afflict many millions of sufferers around the world? Ultimately only more research will tell us this."

Dr Eric Karran, the director of research at Alzheimer's Research UK, said: "The findings present the appealing concept that one treatment could have benefits for a range of different diseases; however the idea is in its early stages. "The research focuses on the effects of the prion protein and we would need to see the same results confirmed in Alzheimer's and Parkinson's to really strengthen the evidence."

http://www.eurekalert.org/pub_releases/2012-05/rumc-pil050412.php

Purpose in life may protect against harmful changes in the brain associated with Alzheimer's disease

Greater purpose in life may help stave off the harmful effects of plaques and tangles associated with Alzheimer's disease, according to a new study by researchers at Rush University Medical Center.

CHICAGO - The study, published in the May issue of the Archives of General Psychiatry, is available online at www.archgenpsychiatry.com. "Our study showed that people who reported greater purpose in life exhibited better cognition than those with less purpose in life even as plaques and tangles accumulated in their brains," said Patricia A. Boyle, PhD.

"These findings suggest that purpose in life protects against the harmful effects of plaques and tangles on memory and other thinking abilities. This is encouraging and suggests that engaging in meaningful and purposeful activities promotes cognitive health in old age."

Boyle and her colleagues from the Rush Alzheimer's Disease Center studied 246 participants from the Rush Memory and Aging Project who did not have dementia and who subsequently died and underwent brain autopsy. Participants received an annual clinical evaluation for up to approximately 10 years, which included detailed cognitive testing and neurological exams.

Participants also answered questions about purpose in life, the degree to which one derives meaning from life's experiences and is focused and intentional. Brain plaques and tangles were quantified after death. The authors then examined whether purpose in life slowed the rate of cognitive decline even as older persons accumulated plaques and tangles.

While plaques and tangles are very common among persons who develop Alzheimer's dementia (characterized by prominent memory loss and changes in other thinking abilities), recent data suggest that plaques and tangles accumulate in most older persons, even those without dementia. Plaques and tangles disrupt memory and other cognitive functions.

Boyle and colleagues note that much of the Alzheimer's research that is ongoing seeks to identify ways to prevent or limit the accumulation of plaques and tangles in the brain, a task that has proven quite difficult. Studies such as the current one are needed because, until effective preventive therapies are discovered, strategies that minimize the impact of plaques and tangles on cognition are urgently needed.

"These studies are challenging because many factors influence cognition and research studies often lack the brain specimen data needed to quantify Alzheimer's changes in the brain," Boyle said. "Identifying factors that promote cognitive health even as plaques and tangles accumulate will help combat the already large and rapidly increasing public health challenge posed by Alzheimer's disease."

The Rush Memory and Aging Project, which began in 1997, is a longitudinal clinical-pathological study of common chronic conditions of aging. Participants are older persons recruited from about 40 continuous care retirement communities and senior subsidized housing facilities in and around the Chicago Metropolitan area. More than 1,500 older persons are currently enrolled in the study. This study was funded by the National Institutes on Aging. The authors thank the NIA for supporting this work and are indebted to the participants and staff of the Rush Memory and Aging Project and Rush Alzheimer's Disease Center for their invaluable contributions.

http://www.eurekalert.org/pub_releases/2012-05/cp-qef050112.php

Gaseous emissions from dinosaurs may have warmed prehistoric earth

Sauropod dinosaurs could in principle have produced enough of the greenhouse gas methane to warm the climate many millions of years ago, at a time when the Earth was warm and wet.

That's according to calculations reported in the May 8th issue of Current Biology, a Cell Press publication. The hulking sauropods, distinctive for their enormous size and unusually long necks, were widespread about 150 million years ago. As in cows, methane-producing microbes aided the sauropods' digestion by fermenting their plant food.

"A simple mathematical model suggests that the microbes living in sauropod dinosaurs may have produced enough methane to have an important effect on the Mesozoic climate," said Dave Wilkinson of Liverpool John Moores University. "Indeed, our calculations suggest that these dinosaurs could have produced more methane than all modern sources - both natural and man-made - put together."

Wilkinson and study coauthor Graeme Ruxton from the University of St Andrews were studying sauropod ecology when a question dawned on them: If modern cows produce enough methane gas to be of interest to climate scientists, what about sauropods? They teamed up with methane expert Euan Nisbet at the University of London to work out the numbers. "Clearly, trying to estimate this for animals that are unlike anything living has to be a bit of an educated guess," Wilkinson said.

Animal physiologists have studied methane production from a range of modern animals to derive equations that predict methane production from animals of different sizes. It turns out that those calculations depend only on the total mass of the animals in question. A medium-sized sauropod weighed something like 20,000 kilograms, and sauropods lived in densities ranging from a few large adults to a few tens of individuals per square kilometer.

Wilkinson, Ruxton, and Nisbet therefore calculate global methane emissions from sauropods to have been 520 million tons (520 Tg) per year, comparable to total modern methane emissions. Before industry took off on modern Earth about 150 years ago, methane emissions were roughly 200 Tg per year. By comparison, modern ruminant animals, including cows, goats, giraffes, and others, produce methane emission of 50 to 100 Tg per year.

The study's conclusions not only show "just how strange and wonderful the workings of the planet are" but also serve as a useful reminder for the importance of microbes and methane for global climate, the researchers say.

Wilkinson et al.: "Could methane produced by sauropod dinosaurs have helped drive Mesozoic climate warmth?."

http://www.eurekalert.org/pub_releases/2012-05/uom-hmd050712.php

Happiness model developed by MU researcher could help people go from good to great

The sayings "variety is the spice of life" and "happiness isn't getting what you want, but wanting what you get" seem to have a psychological basis

COLUMBIA, Mo. - The sayings "variety is the spice of life" and "happiness isn't getting what you want, but wanting what you get" seem to have a psychological basis, according to a new study by an MU psychologist who identified two keys to becoming happier and staying that way.

"Although the Declaration of Independence upholds the right to pursue happiness, that search can be a never-ending quest," said Kennon Sheldon, professor of psychological sciences in the College of Arts and Sciences. "Previous research shows that an individual's happiness can increase after major life changes, such as starting a new romantic relationship, but over time happiness tends to return to a previous level. Through our research, we developed a model to help people maintain higher levels of happiness derived from beneficial changes. The model consists of two major components: the need to keep having new and positive life-changing experiences and the need to keep appreciating what you already have and not want more too soon."

In the recent study, Sheldon, along with co-author Sonja Lyubomirsky of the University of California, Riverside, first surveyed 481 people about their happiness. Six weeks later participants identified a recent positive change in their lives that had made them happier. Six weeks after that, the psychologists evaluated whether the original happiness boost had lasted. For some it had, but for most it had not. The psychologists then tested and confirmed their model for predicting whose boost had lasted.

"The majority got used to the change that had made them happy in the first place," Sheldon said. "They stopped being happy because they kept wanting more and raising their standards, or because they stopped having fresh positive experiences of the change, for example they stopped doing fun things with their new boyfriend and started wishing he was better looking. A few were able to appreciate what they had and to keep having new experiences. In the long term, those people tended to maintain their boost, rather than falling back where they started."

Due to genetics and other factors, individuals have a certain "set-point" of happiness they normally feel. Some people tend to be bubbly, while others are more somber, though individuals vary in a range around their set-point. Sheldon's research suggests how people can train themselves to stay at the top of their possible range of happiness. "A therapist can help a person get from miserable to OK; our study shows how people can take themselves from good to great," Sheldon said. Sheldon also noted that the best life changes don't necessarily equate to new purchases. Although a shiny new possession can boost happiness, that purchase has to be experienced anew every day and appreciated for what it brings to have any lasting effect on happiness.

"The problem with many purchases is that they tend to just sit there," said Sheldon. "They don't keep on providing varied positive experiences. Also, relying on material purchases to make us happy can lead to a faster rise in aspirations, like an addiction. Hence, many purchases tend to be only quick fixes. Our model suggests ways to reduce the 'let down' from those purchases. For example, if you renovate your house, enjoy it and have many happy experiences in the new environment, but don't compare your new decor to the Joneses'."

The study "The Challenge of Staying Happier: Testing the Hedonic Adaptation Prevention (HAP) Model" is currently in press in the journal Personality and Social Psychology Bulletin.

http://www.eurekalert.org/pub_releases/2012-05/uotm-ddc050712.php

Diabetes drug could treat leading cause of blindness

Experiments show that metformin blocks uveitis in laboratory rats

University of Texas Medical Branch at Galveston researchers have discovered that a drug already prescribed to millions of people with diabetes could also have another important use: treating one of the world's leading causes of blindness.

In laboratory rat and cell-culture experiments, the scientists found that metformin, which is commonly used to control blood sugar levels in type 2 diabetes, also substantially reduced the effects of uveitis, an inflammation of the tissues just below the outer surface of the eyeball. Uveitis causes 10 to 15 percent of all cases of blindness in the United States, and is responsible for an even higher proportion of blindness globally. The only treatment now available for the disorder is steroid therapy, which has serious side effects and cannot be used long-term.

"Uveitis has various causes - the most common are infectious diseases and autoimmune disorders - but they all produce inflammation within the eye," said UTMB professor Kota V. Ramana, senior author of a paper on the study now online in the journal Investigative Ophthalmology & Visual Science. "Metformin inhibits the process that causes that inflammation."

The scientists discovered metformin's efficacy when they tested it in rats given an endotoxin that mimicked the inflammatory effects of bacterial infection. The results showed clearly that metformin was a very effective anti-uveitis agent. "We found that the drug is therapeutic as well as preventive - if we gave our rats the drug beforehand, they didn't develop uveitis, and if we gave it after uveitis had developed, it was therapeutic," said UTMB professor Satish Srivastava, also an author of the IOVS paper. "Metformin's strong anti-inflammatory properties make this possible."

According to the researchers, metformin works by activating an enzyme called AMPK, which in turn damps down the activity of the protein NF-kappa B. The inhibition of NF-kappa B suppresses the production of inflammatory signaling molecules - cytokines and chemokines - needed to initiate and sustain uveitis. Because metformin is already used so widely as a therapy for diabetes, the UTMB scientists believe that it has a good chance of being rapidly adopted as an anti-uveitis drug.

"I think after a few more pre-clinical studies are done, we can get this drug to patients in a shorter time than usual," Ramana said. "Its safety is already known, so all that we need to see is its efficacy in humans."

Other authors of the IOVS paper include postdoctoral fellows Nilesh Kalariya and Shoeb Mohammad, and Professor Naseem Ansari. This research was supported by the National Institutes of Health.

http://www.eurekalert.org/pub_releases/2012-05/jhmi-dbs050712.php

Deep brain stimulation may hold promise for mild Alzheimer's disease

Small phase I study suggests 'brain pacemaker' could slow progression of AD

A study on a handful of people with suspected mild Alzheimer's disease (AD) suggests that a device that sends continuous electrical impulses to specific "memory" regions of the brain appears to increase neuronal activity. Results of the study using deep brain stimulation, a therapy already used in some patients with Parkinson's disease and depression, may offer hope for at least some with AD, an intractable disease with no cure.

"While our study was designed mainly to establish safety, involved only six people and needs to be replicated on a larger scale, we don't have another treatment for AD at present that shows such promising effects on brain function," said the study's first author, Gwenn Smith, Ph.D., a professor in the Department of Psychiatry and Behavioral Sciences at the Johns Hopkins University School of Medicine. The research, published in the Archives of Neurology, was conducted while Smith was on the faculty at the University of Toronto, and will be continuing at Toronto, Hopkins and other U.S. sites in the future. The study was led by Andres M. Lozano, chairman of the Department of Neurosurgery at the University of Toronto.

One month and one year after implanting a device that allows for continuous electrical impulses to the brain, Smith and her colleagues performed PET scans that detect changes in brain cells' metabolism of glucose, and found that patients with mild forms of AD showed sustained increases in glucose metabolism, an indicator of neuronal activity. The increases, the researchers say, were larger than those found in patients who have taken the drugs currently marketed to fight AD progression. Other imaging studies have shown that a decrease in glucose metabolism over the course of a year is typical in AD. Alzheimer's disease cannot be precisely diagnosed by brain biopsies until after death.

The team observed roughly 15 percent to 20 percent increases in glucose metabolism after one year of continuous stimulation. The increases were observed, to a greater extent, in patients with better outcomes in cognition, memory and quality of life. In addition, the stimulation increased connectivity in brain circuits associated with memory.

Deep brain stimulation (DBS) requires surgical implantation of a brain pacemaker, which sends electrical impulses to specific parts of the brain. For the study, surgeons implanted a tiny electrode able to deliver a low-grade electrical pulse close to the fornix, a key nerve tract in brain memory circuits. The researchers - most with the University of Toronto - reported few side effects in the six subjects they tested. Just as importantly, says Smith, was seeing that DBS appeared to reverse the downturn in brain metabolism that typically comes with AD.

AD is a progressive and lethal dementia that mostly strikes the elderly. It affects memory, thinking and behavior. Estimates vary, but experts suggest that as many as 5.1 million Americans may have AD and that, as baby boomers age, prevalence will skyrocket. Smith says decades of research have yet to lead to clear understanding of its causes or to successful treatments that stop progression.

The trial of DBS came about, Smith reports, when Lozano used DBS of the fornix to treat an obese man. The procedure, designed to target the regions of the brain involved in appetite suppression, unexpectedly had significant increases in his memory. Inspired, the scientists persisted through rigorous ethical and scientific approvals before their AD phase I safety study could begin.

Smith, who also is director of the Division of Geriatric Psychiatry and Neuropsychiatry at Johns Hopkins Bayview Medical Center, is an authority on mapping the brain's glucose metabolism in aging and psychiatric disease. It was Smith's earlier analysis of AD patients' PET scans that revealed their distinct pattern of lowered brain metabolism. She determined that specific parts of the temporal and parietal cerebral cortex - memory network areas of the brain where AD's earliest pathology surfaces - became increasingly sluggish with time.

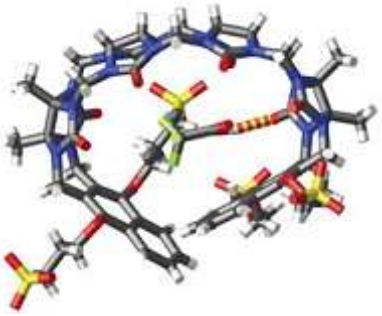
The new study was supported by grants from the Neurosurgical Research and Education Foundation, the Dana Foundation and the Krembil Neuroscience Discovery Fund. Clifford I. Workman, B.S., of Johns Hopkins also contributed to this research.

http://phys.org/news/2012-05-team-drug-dropouts-chance.html

Research team gives drug dropouts a second chance

A cross-disciplinary team of researchers at the University of Maryland has designed a molecular container that can hold drug molecules and increase their solubility

Phys.org - A cross-disciplinary team of researchers at the University of Maryland has designed a molecular container that can hold drug molecules and increase their solubility, in one case up to nearly 3000 times. Their discovery opens the possibility of rehabilitating drug candidates that were insufficiently soluble. It also offers an opportunity to improve successful drugs that could be made even better with better solubility.

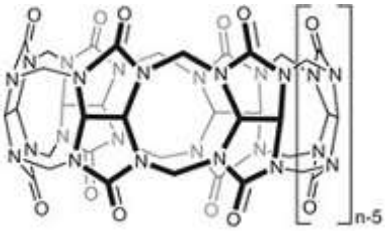


The team's innovative findings were recently published in a study in Nature Chemistry, in which the authors note that "the solubility characteristics of 40-70 percent of new drug candidates are so poor that they cannot be formulated on their own, so new methods for increasing drug solubility are highly prized."

A model of a cucurbituril interacting with CF3CO2H. (C, grey; H, white; N, blue; O, red; F, green; hydrogen bond, red-yellow striped). Credit: NPG

The Maryland scientists where able to increase the solubility of ten insoluble drugs by between 23 and 2,750 times, by forming container-drug complexes. They also show that their containers have low toxicity in human cell line and mice studies, and that the molecular containers can be built from inexpensive and readily available reagents.

"We already are working with drug companies to help them solubilize their interesting drug candidates and hope to get them interested in licensing our technology," says co-leader Volker Briken, an associate professor in the department of cell biology and molecular genetics and also a scientist in the Maryland Pathogen Research Institute.



cucurbit[n]urils - or CB[n] n=5,6,7,8,10.

The team, led by Briken and UMD Chemistry & Biochemistry Professor Lyle Isaacs, created their "new class of general-purpose solubilizing agents" based on a type of compound called cucurbit[n]urils - or CB[n]. These are 'macrocyclic' molecules made up of units of bicyclic glycoluril C4H4N4O2 monomers. The n in CB[n] refers to the number of repeat units in the macrocycle.

Many previous attempts have been made to capture drug molecules within these and other synthetic cages and capsules to increase drugs' solubility, but with limited success.

Issacs and Briken say that next their team would like to increase the variety of novel acyclic CBs in order to be able to solubilize a maximal number of small chemical drug candidates, and also would like to generate CBs that can be specifically targeted - for example to cancer cells. *Provided by University of Maryland*

http://www.sciencedaily.com/releases/2012/05/120507113734.htm

Overweight? New Research Explains How Proper Sleep Is Important for Healthy Weight

If you're counting calories to lose weight, that may be only part of the weight loss equation says a new research report published online in The FASEB Journal.

ScienceDaily - In the report, French scientists show that impairments to a gene known to be responsible for our internal body clocks, called "Rev-Erb alpha," leads to excessive weight gain and related health problems. This provides new insights into the importance of proper alignment between the body's internal timing and natural environmental light cycles to prevent or limit excessive weight gain and the problems this weight gain causes.

According to Etienne Challet, Ph.D., a researcher involved in the work from the Department of Neurobiology of Rhythms at the Institute of Cellular and Integrative Neurosciences at the University of Strasbourg in Pascal, France, "It is now clear that impairment of daily rhythms such as shift-work, exposure to artificial lighting, or jet-lag has multiple adverse effects on human health, every effort should be made to

maintain or restore normal temporal organization and to avoid potentially disruptive behaviors such as nocturnal meals or light exposure at night."

To make this discovery, Challet and colleagues studied two groups of mice. One group was normal and the other group lacked the Rev-Erb alpha gene. In the mice lacking the Rev-Erb alpha gene, it was determined that they became obese and hyperglycaemic even if they ate the same quantity of food at the same time as normal mice. Further scientific investigation showed that when the Rev-Erb alpha-deficient mice were compared to the normal mice, there was a major difference in the way Rev-Erb alpha-deficient mice metabolized the food they ate. The Rev-Erb alpha deficient mice created much more fat than the normal mice, and this occurred specifically during the feeding period. Additionally, the Rev-Erb-alpha deficient mice relied less on carbohydrate stores when at rest.

"The phrase 'sick and tired' could never be more true," said Gerald Weissmann, M.D., Editor-in-Chief of The FASEB Journal. "This research shows that we evolved to live in synch with the natural light and dark cycles of our planet. Strasbourg has long taught us the finer aspects of cuisine; its scientists now explain how night and day can influence whether we are fat or lean."

J. Delezie, S. Dumont, H. Dardente, H. Oudart, A. Grechez-Cassiau, P. Klosen, M. Teboul, F. Delaunay, P. Pevet, E. Challet. The nuclear receptor REV-ERB is required for the daily balance of carbohydrate and lipid metabolism. The FASEB Journal, 2012; DOI: 10.1096/fj.12-208751

http://phys.org/news/2012-05-analysis-france-cave-art-oldest.html

Rock analysis suggests France cave art is 'oldest'

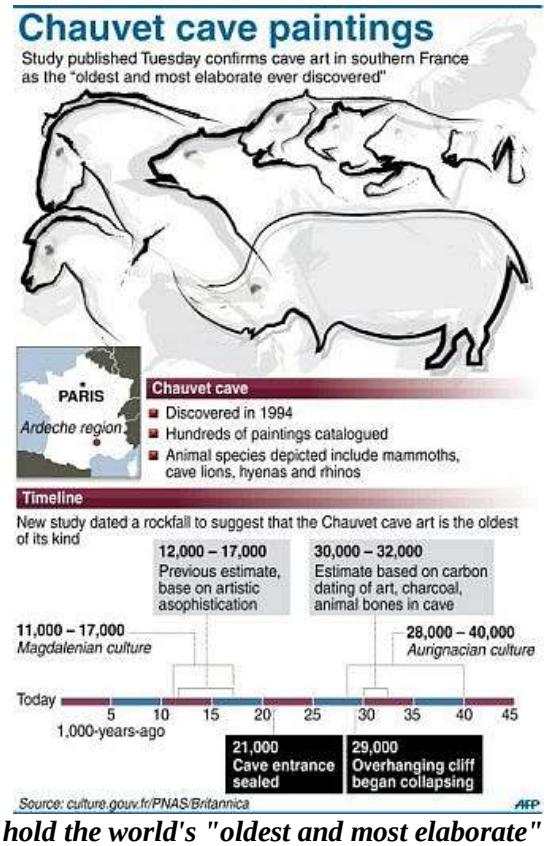
Experts have long debated whether the sophisticated animal drawings in a famous French cave are indeed the oldest of their kind in the world, and a study out Monday suggests that yes, they are.

Experts have long debated whether the sophisticated animal drawings in a famous French cave are indeed the oldest of their kind in the world, and a study out Monday suggests that yes, they are.

The smooth curves and fine details in the paintings of bears, rhinoceroses and horses in the Chauvet cave in southern France's picturesque Ardeche region are so advanced that some scholars thought they dated from 12,000 to 17,000 years ago. That would place them as relics of the Magdalenian culture, in which human ancestors used tools of stone and bone and created increasingly advanced art as time went on.

But scientists have previously shown through radiocarbon dating evidence of rock art, charcoal and animal bones in the Chauvet cave that the drawings are older than that, likely between 30,000-32,000 years old, befuddling some who believed that early art took on more primitive forms. Now, according to research published in the Proceedings of the National Academy of Sciences, a US journal, French scientists believe they have confirmation that the paintings are "the oldest and most elaborate ever discovered."

Their findings are based on an analysis - called geomorphological and chlorine-36 dating - of the rockslide surfaces around what is believed to be the cave's only entrance. The research shows that an overhanging cliff began collapsing 29,000 years ago and did so repeatedly over time, definitively sealing the entrance to humans around 21,000 years ago. That would mean the drawings had to have been done before that, bolstering the notion that they were created by people in the Aurignacian culture, which lived 28,000 to 40,000 years ago.



Graphic on the Chauvet cave in southern France, confirmed to hold the world's "oldest and most elaborate" prehistoric art ever discovered, according to a geological study to establish the age of the paintings.

"Remarkably agreeing with the radiocarbon dates of the human and animal occupancy, this study confirms that the Chauvet cave paintings are the oldest and the most elaborate ever discovered, challenging our current knowledge of human cognitive evolution," said the study.

According to lead author Benjamin Sadier, the findings put an end to any debate over when the drawings may have been done based on their style. "What our work shows, and other work that will soon be published, is that the method of dating by style is no longer valid," he told AFP in a phone interview.

"By proving that this cave was closed for good 21,500 years ago, we completely eradicate the hypothesis of a more recent painting of the cave, and we also confirm the age of the cave which was already known through radiocarbon dating," he added. "Before we were pretty sure. And now we are sure. It's a way of gathering independent proof, meaning we can figure out the age of the cave by geological means, not archeological ones."

The cave and its remarkably well-preserved paintings were closed to human access by the rockfalls and were only recently rediscovered in 1994.

Researchers involved in the work came from France's University of Savoie, Aix Marseille University and the Centre National de Prehistoire. More information: "Further constraints on the Chauvet cave artwork elaboration," by Benjamin Sadier et al. PNAS (2012).

http://www.eurekalert.org/pub_releases/2012-05/bidm-fcf050312.php

Flavonoid compound found in foods and supplements shown to prevent the formation of blood clots

Research findings offer a new direction for a therapeutic agent to prevent stroke, heart attack

BOSTON - A compound called rutin, commonly found in fruits and vegetables and sold over the counter as a dietary supplement, has been shown to inhibit the formation of blood clots in an animal model of thrombosis.

These new findings, led by investigators at Beth Israel Deaconess Medical Center (BIDMC) and published in today's on-line issue of The Journal of Clinical Investigation (JCI), identify a novel strategy for preventing thrombosis, and help pave the way for clinical testing of this popular flavonoid as a therapy for the prevention and treatment of stroke and heart attack, as well as deep venous thrombosis (DVT) and pulmonary embolism.

"It's not always fully appreciated that the majority of Americans will die as the result of a blood clot in either their heart or their brain," says senior author Robert Flaumenhaft, MD, PhD, an investigator in the Division of Hemostasis andThrombosis at BIDMC and Associate Professor of Medicine at Harvard Medical School. "Approximately half of all morbidity and mortality in the United States can be attributed to heart attack or stroke."

The study focused on protein disulfide isomerase (PDI) which is found in all cells. Investigators in BIDMC's Division of Hemostasis and Thrombosis had previously shown that PDI is rapidly secreted from both platelets and endothelial cells during thrombosis, when a clot forms in a blood vessel, and that inhibition of PDI could block thrombosis in a mouse model.

"This was a transformative and unanticipated finding because it identified, for the first time, that PDI is secreted from cells in a live animal and is a potential target for preventing thrombosis," says Flaumenhaft. However, because intracellular PDI is necessary for the proper synthesis of proteins, the scientists had to identify a specific compound that could block the thrombosis-causing extracellular PDI – without inhibiting the intracellular PDI.

They began by conducting a high-throughput screen of a wide array of compounds to identify PDI inhibitors. Among the more than 5,000 compounds that were screened, quercetin-3-rutinoside (rutin) emerged as the most potent agent. "Rutin was essentially the champion compound," says Flaumenhaft.

A bioflavonoid that is naturally found in many fruits, vegetables and teas including onions, apples and citrus fruits, rutin is also sold as an herbal supplement, having received a special designation for safety from the U.S. Food and Drug Administration (FDA).

Surprisingly, studies of the rutin molecule demonstrated that the same part of the molecule that provides rutin with its ability to inhibit PDI also prevents the compound from entering cells. "That finding explained how this compound can be both a potent inhibitor of PDI and a safe food supplement," says Flaumenhaft. "Our next questions were, 'Is this compound anti-thrombotic? Can it prevent blood clots?'"

The team went on to test rutin in a mouse model of thrombosis. Because they knew that humans would be taking rutin in pill form, they included studies in which the compound was administered orally and determined that it successfully retained its anti-thrombotic properties when it was metabolized following oral ingestion.

"Rutin proved to be the most potently anti-thrombotic compound that we ever tested in this model," says Flaumenhaft. Of particular note, rutin was shown to inhibit both platelet accumulation and fibrin generation during thrombus formation. "Clots occur in both arteries and in veins," explains Flaumenhaft. "Clots in arteries are platelet-rich, while those in veins are fibrin-rich. This discovery suggests that a single agent can treat and prevent both types of clots."

Even with the use of existing anti-clotting therapies, such as aspirin, clopidogrel (Plavix) and warfarin (Coumadin), each year there are approximately 400,000 recurrent episodes among patients who previously experienced a stroke or heart attack, says Flaumenhaft.

"A safe and inexpensive drug that could reduce recurrent clots could help save thousands of lives," he adds. "These pre-clinical trials provide proof-of-principle that PDI is an important therapeutic target for anti-thrombotic therapy, and because the FDA has already established that rutin is safe, we are poised to expeditiously test this idea in a clinical trial, without the time and expense required to establish the safety of a new drug."

The original research that identified this mechanism as well as the identification of PDI as a drug target of rutin was supported primarily by grants from the National Heart, Lung and Blood Institute of the National Institutes of Health (NIH) and also from the American Heart Association. Additional support came from the European Hematology Association-American Society of Hematology and the Foundation for Women's Wellness.

Study coauthors include BIDMC investigators Reema Jasuja (first author), Freda H. Passam, Daniel R. Kennedy, Sarah H. Kim, Lotte van Hessem, Lin Lin, Sheryl R. Bowley, Sucharit S. Joshi, James R. Dilks, Bruce Furie and Barbara C. Furie, all of the Division of Hemostasis and Thrombosis.

http://news.sciencemag.org/sciencenow/2012/05/dogs-feel-your-pain.html?ref=hp

Dogs Feel Your Pain

Yawn next to your dog, and she may do the same. Though it seems simple, this contagious behavior is actually quite remarkable: Only a few animals do it, and only dogs cross the species barrier.

by Zuberoa Marcos on 7 May 2012, 4:32 PM

Now a new study finds that dogs yawn even when they only hear the sound of us yawning, the strongest evidence yet that canines may be able to empathize with us.

Besides people and dogs, contagious yawning has been observed in gelada baboons, stump-tail macaques, and chimpanzees. Humans tend to yawn more with friends and acquaintances, suggesting that "catching" someone's yawn may be tied to feelings of empathy. Similarly, some studies have found that dogs tend to yawn more after watching familiar people yawning.

But it is unclear whether the canine behavior is linked to empathy as it is in people. One clue might be if even the mere sound of a human yawn elicited yawning in dogs.

To that end, scientists at the University of Porto in Portugal recruited 29 dogs, all of whom had lived for at least 6 months with their owners. To reduce anxiety, the study was performed in familiar rooms in the dogs' homes and in the presence of a known person but with no visual contact with their owners.

The team, led by behavioral biologist Karine Silva, recorded yawning sounds of the dogs' owners and an unfamiliar woman as well as an artificial control sound consisting of a computer-reversed yawn. (To help induce natural yawning, volunteers listened to an audio loop of prerecorded yawns over headphones.) Each dog heard all of the sounds in two sessions, each carried out 7 days apart. During the sessions, the researchers measured the number of elicited yawns in dogs in response to sounds from known and unknown people.

As the team will report in the July issue of Animal Cognition, 12 out of 29 dogs yawned during the experiment. On average, canines yawned five times more often when they heard humans they knew yawning as opposed to control sounds. "These results suggest that dogs have the capacity to empathize with humans," says Silva.

That's not surprising, she says. People first began domesticating dogs at least 15,000 years ago, and since then we've bred them to perform increasingly complex tasks, from hunting to guiding the blind. This close relationship may have fostered cross-species empathy over the millennia.

"This study tells us something new about the mechanisms underlying contagious yawning in dogs," says Evan McLean, a Ph.D. student at Duke University's Canine Cognition Center in Durham, North Carolina, who was not part of the study. "As in humans, dogs can catch this behavior using their ears alone." Still, he notes, the experiments don't tell us much about the nature of empathy in dogs. "Do they think about our emotions and internal states the way we do as humans?"

Ádám Miklósi, an ethologist at the Eötvös Loránd University in Budapest, agrees. "Using behaviors as indicators will only show some similarity in behavior," he says, "but it will never tell us whether canine empathy, whatever this is, matches human empathy." Previous work has shown, for example, that when dogs look guilty, they may not actually be feeling guilty.

"Dogs can simulate very well different forms of social interest that could mislead people to think they are controlled by the same mental processes," says Miklósi, "but they may not always understand the complexity of human behavior."

http://www.nature.com/news/human-brain-shaped-by-duplicate-genes-1.10584

Human brain shaped by duplicate genes

Multiple copies of a gene may have boosted the computational power of our ancestors' brains.

Ewen Callaway

Humans walk on two feet and (mostly) lack hair-covered bodies, but the feature that sets us furthest apart from other apes is a brain capable of language, art, science, and other trappings of civilisation.

Now, two studies published online today in Cell1, 2 suggest that DNA duplication errors that happened millions of years ago might have had a pivotal role in the evolution of the complexity of the human brain. The duplications - which created new versions of a gene active in the brains of other mammals - may have endowed humans with brains that could create more neuronal connections, perhaps leading to greater computational power.

The enzymes that copy DNA sometimes slip extra copies of a gene into a chromosome, and scientists estimate that such genetic replicas make up about 5% of the human genome. However, gene duplications are notoriously difficult to study because the new genes differ little from their forebears, and tend to be overlooked.

Evan Eichler, a geneticist at the University of Washington in Seattle, and lead author of one of the Cell papers, previously found that humans have four copies of a gene called SRGAP2, and he and his colleagues decided to investigate.

In their new paper, they report that the three duplicated versions of SRGAP2 sit on chromosome 1, along with the original ancestral gene, but they are not exact copies. All of the duplications are missing a small part of the ancestral form of the gene, and at least one duplicate, SRGAP2C, seems to make a working protein. Eichler's team has also found SRGAP2C in every individual human genome his team has examined – more than 2,000 so far – underscoring its significance.

"Ten years after the human genome was sequenced and declared done, we're still finding new genes in new places that are really important to human brain function and evolution," says Eichler.

Eichler's team calculates that SRGAP2C appeared roughly 2.4 million years ago, around the time that big-brained species of Homo evolved in Africa from smaller-skulled Australopithecines, and around the time that stone tools appeared in the fossil record. These ancient hominins eventually gave rise to Homo erectus, which were the first human ancestors to wander beyond Africa, roughly 1.8 million years ago.

Boosting brains

According to a second study, also published in Cell2, the emergence of SRGAP2C could have helped our ancestors to boost the power of their bigger brains, which may have been created by other, unknown changes in the genome. "It's got to play some important function," says Franck Polleux, a neurobiologist at the Scripps Research Institute in La Jolla, California, and senior author of the second paper in Cell.

Surprisingly, the SRGAP2C protein blocks the action of the ancestral protein, Polleux's team discovered, effectively rendering humans as 'knockouts' for the ancestral SRGAP2 gene. The team then expressed the human form of SRGAP2C in the neurons of developing mice. The change didn't cause the mice brains to enlarge, but their neurons produced denser arrays of brain cell structures, called dendritic spines, that forge connections with neighbouring neurons.

"If you're increasing the total number of connections, you're probably increasing the ability of this network to handle information," Polleux says. "It's like increasing the number of processors in a computer."

In mice, the gene also increased the migration speed of neurons across the developing brain. Polleux's team speculates that this trait could also have helped neurons to travel long distances in the enlarged brains of human ancestors.

"One has to be cautious about putting too much emphasis on the role of one gene in brain evolution," says Genevieve Konopka, a neuroscientist at the University of Texas Southwestern Medical Center in Dallas. But she thinks that the two papers make a good case that duplication of SRGAP2 influenced human cognition.

James Sikela, an evolutionary geneticist at the University of Colorado, Denver, adds that the SRGAP2 duplications are likely to be one of a multitude of genetic changes that moulded the human brain. His team has identified dozens of duplicated genes unique to humans3, many of them expressed in the brain. "Finding the genes that make us human may be challenging," he says, "but the resources we now have to ask such questions are unprecedented."

Dennis, M. Y. et al. Cell http://dx.doi.org/10.1016/j.cell.2012.03.033 (2012).
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http://www.sciencedaily.com/releases/2012/05/120508152000.htm

Gestures Fulfill a Big Role in Language

Scientists have discovered that actual actions on objects, such as physically stirring a spoon in a cup, have less of an impact on the brain's understanding of speech than simply gesturing as if stirring a spoon in a cup.

ScienceDaily - People of all ages and cultures gesture while speaking, some much more noticeably than others. But is gesturing uniquely tied to speech, or is it, rather, processed by the brain like any other manual action?

A U.S.-Netherlands research collaboration delving into this tie discovered that actual actions on objects, such as physically stirring a spoon in a cup, have less of an impact on the brain's understanding of speech than simply gesturing as if stirring a spoon in a cup. This is surprising because there is less visual information contained in gestures than in actual actions on objects. In short: Less may actually be more when it comes to gestures and actions in terms of understanding language.

Spencer Kelly, associate professor of Psychology, director of the Neuroscience program, and co-director of the Center for Language and Brain at Colgate University, and colleagues from the National Institutes of Health and Max Planck Institute for Psycholinguistics will present their research at the Acoustics 2012 meeting in Hong Kong, May 13-18, a joint meeting of the Acoustical Society of America (ASA), Acoustical Society of China, Western Pacific Acoustics Conference, and the Hong Kong Institute of Acoustics.

Among their key findings is that gestures - more than actions - appear to make people pay attention to the acoustics of speech. When we see a gesture, our auditory system expects to also hear speech. But this is not what the researchers found in the case of manual actions on objects.

Just think of all the actions you've seen today that occurred in the absence of speech. "This special relationship is interesting because many scientists have argued that spoken language evolved from a gestural communication system - using the entire body - in our evolutionary past," points out Kelly. "Our results provide a glimpse into this past relationship by showing that gestures still have a tight and perhaps special coupling with speech in present-day communication. In this way, gestures are not merely add-ons to language - they may actually be a fundamental part of it."

A better understanding of the role hand gestures play in how people understand language could lead to new audio and visual instruction techniques to help people overcome major challenges with language delays and disorders or learning a second language.

What's next for the researchers? "We're interested in how other types of visual inputs, such as eye gaze, mouth movements, and facial expressions, combine with hand gestures to impact speech processing. This will allow us to develop even more natural and effective ways to help people understand and learn language," says Kelly.

The above story is reprinted from materials provided by Acoustical Society of America (ASA), via Newswise.

http://news.discovery.com/tech/nanocomposite-can-reverse-cavities-120508.html

Nanocomposite Can Reverse Cavities

Dental fillings replace the part of the tooth drilled out in order to remove decay. But if any bacteria remains, the cavity can grow right under the filling.

Analysis by Christina Ortiz

A new composite material, made up of silver and calcium nanoparticles, could work as a dental filling that kills remaining bacteria, so that patients don't have to make a return trip to the dentist. The material, developed by researchers at the University of Maryland, also rebuilds any structure affected by decay - essentially getting rid of the cavity altogether.

Because of their small size, the silver nanoparticles can invade the cellular structure of bacteria and other microorganisms and kill them. Calcium phosphate, also included in the composite, is responsible for building the tooth back up.

There have been questions raised about implementing these materials into toothpaste or mouthwash, but the scientific community isn't ready to get onboard with that idea just yet. There is a lot of concern coming from scientists and researchers about the possible harmful effects of human consumption of the particles. Further testing will be conducted on volunteers to sort through the health concerns.

http://www.bbc.co.uk/news/health-17989371

'One in six cancers worldwide are caused by infection'

One in six cancers - two million a year globally - are caused by largely treatable or preventable infections, new estimates suggest.

By Michelle Roberts Health editor, BBC News online

The Lancet Oncology review, which looked at incidence rates for 27 cancers in 184 countries, found four main infections are responsible. These four - human papillomaviruses, Helicobacter pylori and hepatitis B and C viruses - account for 1.9m cases of cervical, gut and liver cancers.Most cases are in the developing world.

The team from the International Agency for Research on Cancer in France, part of the World Health Organization, says more efforts are needed to tackle these avoidable cases and recognise cancer as a communicable disease.

'Preventable'

The proportion of cancers related to infection is about three times higher in parts of the developing world, such as east Asia, than in developed countries like the UK - 22.9% versus 7.4%, respectively. Nearly a third of cases occur in people younger than 50 years. Among women, cancer of the cervix accounted for about half of the infection-related cancers. In men, more than 80% were liver and gastric cancers.

Drs Catherine de Martel and Martyn Plummer, who led the research, said: "Infections with certain viruses, bacteria, and parasites are some of the biggest and preventable causes of cancer worldwide

"Application of existing public-health methods for infection prevention, such as vaccination, safer injection practice, or antimicrobial treatments, could have a substantial effect on the future burden of cancer worldwide."

Vaccines are available to protect against human papillomavirus (HPV) - which is linked to cancer of the cervix - and hepatitis B virus - an established cause of liver cancer. And experts know that stomach cancer can be avoided by clearing the bacterial infection H. pylori from the gut using a course of antibiotics.

Commenting on the work, Dr Goodarz Danaei from Harvard School of Public Medicine in Boston, the US, said: "Since effective and relatively low-cost vaccines for HPV and HBV are available, increasing coverage should be a priority for health systems in high-burden countries."

Jessica Harris of Cancer Research UK said: "It's important that authorities worldwide make every effort to reduce the number of infection-related cancers, especially when many of these infections can be prevented. In the UK, infections are thought to be responsible for 3% of cancers, or around 9,700 cases each year.

"Vaccination against HPV, which causes cervical cancer, should go a long way towards reducing rates of this disease in the UK. But it's important that uptake of the vaccination remains high. At a global level, if the vaccine were available in more countries, many thousands more cases could be prevented."

http://www.eurekalert.org/pub_releases/2012-05/idso-ito050712.php

Investigators trace of role reusable grocery bag in norovirus outbreak

Oregon investigators recently mapped the trail of an outbreak of a nasty stomach bug among participants in a girls' soccer tournament to a reusable open top grocery bag stored in a hotel bathroom.

Their findings, which illustrate the role that inanimate objects can play in spreading norovirus infection, appear in The Journal of Infectious Diseases.

Noroviruses are a leading cause of gastroenteritis worldwide and the most common cause of foodborne outbreaks in the United States. Highly contagious, even in low concentrations, the viruses spread efficiently from feces and vomit by direct contact or by indirect transmission from viral contamination of surfaces. In October 2010, a cluster of gastroenteritis that appeared in a group of people with no apparent direct physical contact with a pathogen challenged investigators to find the cause and take appropriate control measures.

In the study, Kimberly K. Repp, PhD, MPH, of Oregon Health and Sciences University, and William E. Keene, PhD, MPH, of the Oregon Public Health Division in Portland, investigated an outbreak in a group of 17 Oregon girls, 13-14 years old, and their four adult chaperones attending a soccer tournament in Washington state. All had traveled in private automobiles, shared hotel rooms, and eaten at local restaurants. Eight cases were identified, including the index patient who was presumably infected prior to the trip. There was no direct contact between the original patient and her teammates after her symptoms began; before her overt symptoms began she left her room and moved in with a chaperone. The girl subsequently began vomiting and having diarrhea in the chaperone's bathroom. The outbreak affecting the rest of the team began several days later; they were exposed by handling a bag of snacks that unfortunately had been stored in the hotel bathroom. Virus aerosolized within the bathroom likely settled onto the grocery bag and its contents. Matching viruses were found on the reusable shopping bag two weeks later.

The investigation confirmed the great potential for contamination of surfaces in norovirus outbreaks on cruise ships, in nursing homes, and in other group settings. "While we certainly recommend not storing food in bathrooms," the authors note, "it is more important to emphasize that areas where aerosol exposures may have occurred should be thoroughly disinfected; this includes not only exposed surfaces, but also objects in the environment" that could become contaminated and spread infection. The authors point to some of the practices that can be put in place to limit outbreaks caused by such indirect contact, including disinfection of affected areas and the use of multiple bathrooms with one dedicated for use by those who are sick.

In an accompanying editorial, Aron J. Hall, DVM, MSPH, of the Centers for Disease Control and Prevention, notes that noroviruses "are perhaps the perfect human pathogens," causing an estimated 21 million cases of acute gastroenteritis annually in the U.S. alone. The investigation of this outbreak, as reported by the study authors, "provides a fascinating example of how a unique exposure and transmission scenario can result in a norovirus outbreak."

http://www.newscientist.com/article/dn21792-thank-grandmothers-for-lower-incidence-of-cancer.html

Thank grandmothers for lower incidence of cancer

If not for caring grandmothers, almost every woman would have a gene that gives them up to an 80 per cent chance of getting breast cancer and a 64 per cent chance of ovarian cancer.

Although women with the “BRCA1/2 "breast cancer gene" are much more fertile, this gene is not ubiquitous

If it weren't for caring grandmothers, almost every woman would have a gene that gives them up to an 80 per cent chance of getting breast cancer and a 64 per cent chance of ovarian cancer. At least so says one researcher.

A US study last year found that women with either of the BRCA1 or BRCA2 "breast cancer genes" tend to have more children. In fact, the increase in fertility is so extreme that geneticist Jack da Silva from the University of Adelaide, Australia, says that after just four generations, pretty much every woman should have picked up one of the genes. "This represents an extremely strong selection and begs the question: why are these mutations not extremely common?" says da Silva.

He thinks it all comes down to grandma. Most women who develop cancer and die because of BRCA1 or BRCA2 do so after menopause, so the genes do not directly limit the number of children they have.

But the genes do limit the number of grandchildren the women can help their daughters care for, since they are more likely to die in their 50s and 60s than women without the genes. When humans were mostly hunter-gatherers, grandmother care was so important for the survival of youngsters that it may have cancelled out the fertility advantage of those with BRCA1 or BRCA2, says da Silva. "If there was a grandmother effect then that could go towards explaining why these mutations aren't as common as you would expect from the increase in fertility they cause," he says.

Contraceptive effect

Last year's study, led by Ken Smith at the University of Utah in Salt Lake City, found fertility was about 50 per cent higher among women with BRCA1 or BRCA2 born before 1930. The differences were still present among women born later but they were less pronounced, probably because contraception has reduced fertility rates regardless of genetics.

When da Silva analysed Smith's results, he found very little evidence of a grandmother effect, but he thinks this is a reflection of modern society – the effect would have been much stronger in the past.

"My take on it is that we've been living as hunter-gatherers for 95 per cent of our history or more," he says. "What mainly explains the frequency of these mutations today is probably what was going on in hunter-gatherer populations." What about the period during which humans had mostly shifted away from hunter-gathering but had yet to adopt contraception? "That has been bothering me too," da Silva says. The key question is how long that period lasted, he says. "I don't know."

Tell-tale telomeres

Nobody knows exactly why women with the BRCA genes have more children, but Smith thinks it has to do with their telomeres. "The idea is that women with BRCA1/2 mutations have longer telomeres and that women with longer telomeres have greater reproductive success," Smith says. "And those with longer telomeres have higher rates of cancer." Smith thinks da Silva's arguments are interesting but "the task of reconstructing the evolutionary past is inherently difficult".

It didn't occur to Smith that the grandmother effect might be responsible for the genes not being ubiquitous but he says his work was concerned with the opposite question. "Our main objective, without knowing what we would find, was to ask why the mutation was still present in the population at all."

Journal reference: Proceedings of the Royal Society B, DOI: 10.1098/rspb.2012.0542

http://www.bbc.co.uk/news/health-18004050

Strokes: Drawing test 'may predict risks in older men'

A simple drawing test may help predict the risk of older men dying after a first stroke, a study in the journal BMJ Open suggests.

Taken while healthy, the test involves drawing lines between numbers in ascending order as fast as possible.

Men who scored in the bottom third were about three times as likely to die after a stroke compared with those who were in the highest third. The study looked at 1,000 men between the ages of 67 and 75 over 14 years. Of the 155 men who had a stroke, 22 died within a month and more than half within an average of two- and-a-half years. The researchers think that tests are able to pick up hidden damage to brain blood vessels when there are no other obvious signs or symptoms.

Drawing lines between ascending numbers- the test needs to be done as fast as possible

Silent injury

Dr Clare Walton, from the Stroke Association, said: "This is an interesting study because it suggests there may be early changes in the brain that puts someone at a greater risk of having a fatal stroke.

"This is a small study and the causes of poor ability on the drawing task is not known. Although much more research is needed, this task has the potential to screen for those most at risk of a severe or fatal stroke before it occurs so that they can benefit from preventative treatments."

Dr Bernice Wiberg, lead author from Uppsala University in Sweden, said: "As the tests are very simple, cheap and easily accessible for clinical use, they could be a valuable tool - alongside traditional methods like measuring blood pressure (and) asking about smoking - for identifying risk of stroke, but also as a possible important predictor of post-stroke mortality." She also suggested it could help improve information given to patients and their family. More than 150,000 people suffer a stroke every year.

http://www.eurekalert.org/pub_releases/2012-05/jdc-upk050812.php

Unique physiology key to diagnosing and treating diabetes in Asian populations

As the diabetes epidemic spreads worldwide, there is growing concern for Asian American populations, who are nearly twice as likely to develop diabetes, particularly type 2 diabetes.

Boston - Compounding the problem, many of the standard ways to detect diabetes fail in people of Asian descent.

"The medical profession needs to be aware of and address the unique characteristics of this population," said George L. King, M.D., Chief Scientific Officer at Joslin Diabetes Center and Professor of Medicine at Harvard Medical School (HMS). "Without this understanding, diabetes could be misdiagnosed or missed altogether."

Dr. King was lead author of nine diabetes specialists nationwide who collaboratively wrote an article published in the May 2012 edition of Diabetes Care highlighting a comprehensive range of research findings presented at an international symposium held in Honolulu in September 2011.

The authors compiled extensive data on various groups that comprise the Asian American population, encompassing immigrants from numerous East Asian countries and those born in the United States. They also studied diabetes incidence in Native Hawaiians and Pacific Islanders.

Although there are large differences in immigration patterns and lifestyle adaptations to U.S. culture among these groups, common threads and new insights are emerging. Researchers are finding significant differences in how diabetes affects the body's chemistry, how to view body weight, and why commonly used laboratory tests may not be reliable in Asian populations.

"Type 1 diabetes can be difficult to clinically differentiate from type 2 diabetes in Asians," said Dr. William C. Hsu, M.D., who with Dr. King co-directs the Asian American Diabetes Initiative at Joslin. Dr. Hsu, an Assistant Professor of Medicine at HMS, was lead author of a team of 12 experts who wrote a second article published in the same edition of Diabetes Care. These authors focused on the pathophysiology, or the disease process, of diabetes.

Type 1 diabetes is relatively rare in Asians, with incidence five to 10 times lower than in people of European descent. But diagnosing the disease is more difficult because genetic markers and blood factors generally associated with type 1 diabetes are present in only 30 percent of patients of Asian descent. In other words, simply relying on conventional tests would lead to misdiagnosis of a large percentage of Asians who have type 1 diabetes. More research is needed to learn what other biological factors in Asians patients lead to the

destruction of insulin-making beta cells, resulting in type 1 diabetes. Lab tests then could be developed to detect these specific factors.

Type 2 diabetes is the most common form of diabetes in Asian Americans, with prevalence of diagnosed cases in recent years jumping from approximately 1 or 2 percent to 10 percent today, compared with 6 percent in the general population. Many others are undiagnosed or at risk, falling into the "pre-diabetes" category. In type 2 diabetes, the pancreas produces insulin but not enough, or the body's cells resist its effect. A risk factor commonly associated with type 2 diabetes is excess weight, often measured by calculating the body mass index (BMI).

But for Asian Americans with type 2 diabetes, the average BMI is between 24 and 25, well within the normal BMI range (19□) for the general population.

"The BMI in Asian patients can be misleading. They can look quite skinny," Dr. Hsu said. "Instead, we're learning that a better indicator of type 2 diabetes risk in Asians is fat deposits at the waistline." More research is needed to understand how visceral fat contributes to the onset of type 2 diabetes. If detected in the pre-diabetes stage, the disease often can be prevented.

To diagnose diabetes, a commonly used tool - the fasting plasma glucose - fails to detect abnormal glucose tolerance in many Asian Americans. The authors recommend the oral glucose tolerance test, which although more cumbersome to do, has greater sensitivity and reliability in Asian populations.

Per diabetes complications, physicians need be aware that Asian Americans with diabetes tend to have a lower incidence of cardiovascular disease but higher rates of end-stage renal disease. These patients need to be monitored and treated accordingly.

Per treatments for diabetes, the authors cited the need for more studies: "The unique features of diabetes pathophysiology within this very heterogeneous population may indicate a need for different treatment guidelines." Insulin dosing, oral medications and lifestyle factors such as exercise and nutrition should be enfolded into a diabetes care program tailored to individuals, families and cultural practices.

The team of experts at Joslin's Asian Diabetes Initiative has found that educational materials are most effective when published in both the Asian language and English, allowing younger and older generations to communicate fluidly. Joslin also has developed multilingual websites.

Community-based education programs, which also have proved to be highly effective, need to be expanded. And in national data collection, it is important to include Asian groups as subsets of the general population, with culturally appropriate methods incorporated into the design of surveys.

"While there is much to be gained from ethnically sensitive care, these considerations are only a starting point," Dr. Hsu said. "Ultimately, all diabetes care needs to be tailored to the individual. That's the direction that medicine is going, and all populations will benefit."

http://www.eurekalert.org/pub_releases/2012-05/uom-iwa050912.php

Improved waiting area design increases customer comfort, MU study finds

Many diners cringe at the thought of waiting for a table in a crowded restaurant, while restaurant managers hope they do not lose customers due to long waits.

COLUMBIA, Mo. – Now, a University of Missouri researcher has studied restaurant design and has recommendations for how restaurateurs can design waiting areas to be more comfortable, thus increasing diners' willingness to wait for a table.

"Our study shows that waiting area design has an effect on diners," said So-Yeon Yoon, associate professor of architectural studies in the College of Human Environmental Sciences. "By redesigning waiting areas, restaurant owners can make more money, and customers can have a more enjoyable experience."

Yoon provides the following recommendations to increase customer comfort and privacy:

Design waiting areas with outward curving or angled walls, as opposed to open square rooms, so customers cannot see all waiting patrons at once;

Provide several waiting areas for customers, possibly on different sides of the restaurant, etc;

Visually divide the waiting space using plants or decorative elements to give diners more privacy and less sense of crowding.

Yoon conducted the study using a virtual reality environment. Participants were presented with one of two randomly selected types of waiting areas in a virtual restaurant, each with a different level of crowding. Then, they navigated through the virtual environment. Following the experiment, participants self-reported how the different crowding environments made them feel. Yoon found that participants who could see many waiting patrons felt less comfortable and were more likely to leave than those with fewer patrons waiting in close proximity.

In the future, Yoon plans to continue her research in the recently opened Immersive Visualization Lab (iLab). The MU iLab incorporates three large high-definition projection screens aligned side-by-side to create one continuous, horizontal viewing screen. Wearing special "active shutter" glasses, students are able to view their computer-generated architectural and interior designs on the screen in 3-D. The immersive effect of the large screen gives students the sensation of standing inside the buildings they are designing.

Yoon's study was published in the International Journal of Contemporary Hospitality Management. She collaborated with Johye Hwang and Lawrence Bendle of Kyung Hee University.

http://www.sciencedaily.com/releases/2012/05/120509092524.htm

Reusable Grocery Bags Kept in Bathroom Implicated in Norovirus Outbreak

Oregon investigators recently mapped the trail of an outbreak of a nasty stomach bug among participants in a girls' soccer tournament to a reusable open top grocery bag stored in a hotel bathroom.

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http://www.sciencedaily.com/releases/2012/05/120509123854.htm

Hot Sauce Ingredient Reduces 'Beer Belly' Fat as a Weight-Loss Surgery Alternative

According to research from Brigham and Women's Hospital (BWH), the ingredient that gives hot sauce its heat could play a role in the future of weight loss.

ScienceDaily - Ali Tavakkoli, MD, BWH Department of Surgery, and his team have published a study investigating whether two surgeries called vagal de-afferentation-which uses capsaicin, the component responsible for the chili pepper's burning sensation-and vagatomy can achieve weight loss and reduce the risk of obesity-related diseases with fewer side effects when compared to today's bariatric surgical options.

The study is published in the May issue of Digestive Diseases and Sciences. The study is accompanied by an editorial by Edward A. Fox, PhD, Purdue University.

After testing the two surgeries in the lab, the researchers found that vagotomy significantly reduced total body fat, as well as visceral abdominal fat-the "beer belly" fat that pads the spaces between abdominal organs.

Vagal de-afferentation also reduced these fats, but to a lesser degree. However, according to the researchers, the reduction is still remarkable.

"The reduction in visceral fat is particularly important," said Tavakkoli. "High visceral fat volume is a marker of obesity and obesity-related diseases, such as diabetes. Preferentially lost visceral fat after vagal de-afferentation highlights the potential for this procedure."

Vagotomy involves removing the vagus nerve, which sends information between the gut and the brain. Vagal de-afferentation also involves the vagus nerve. But rather than removing the nerve completely, surgeons use capsaicin to destroy only certain nerve fibers.

Capsaicin destroys the nerve fibers that take signals from the gut to the brain, leaving intact the nerve fibers that send signals in the opposite direction, from the brain to the gut.

Between the two surgeries, vagal de-afferentation is associated with fewer side effects.

The researchers note that more work needs to be done on whether these surgeries can be used on humans, and whether capsaicin could be applied directly to human vagal fibers. The study results, however, provide promise of what the future can hold.

"As demand for surgeries that reduce weight and obesity-related diseases increases, procedures that can achieve success in a less invasive fashion will become increasingly important," said Tavakkoli. "This is an important and developing surgical discipline, especially as diabetes rates soar worldwide, and people try to find effective therapies to fight this epidemic."

This research was supported by Harvard Clinical Nutrition Center, Berkeley Fellowship and George Herbert Hunt Travelling Fellowship, and Nutricia Foundation Fellowship.

http://www.sciencedaily.com/releases/2012/05/120509180113.htm

Scientists Identify Neurotranmitters That Lead to Forgetting

While we often think of memory as a way of preserving the essential idea of who we are, little thought is given to the importance of forgetting to our wellbeing

ScienceDaily - While we often think of memory as a way of preserving the essential idea of who we are, little thought is given to the importance of forgetting to our wellbeing, whether what we forget belongs in the "horrible memories department" or just reflects the minutia of day-to-day living.

Despite the fact that forgetting is normal, exactly how we forget - the molecular, cellular, and brain circuit mechanisms underlying the process - is poorly understood.

Now, in a study that appears in the May 10, 2012 issue of the journal Neuron, scientists from the Florida campus of The Scripps Research Institute have pinpointed a mechanism that is essential for forming memories in the first place and, as it turns out, is equally essential for eliminating them after memories have formed.

"This study focuses on the molecular biology of active forgetting," said Ron Davis, chair of the Scripps Research Department of Neuroscience who led the project. "Until now, the basic thought has been that forgetting is mostly a passive process. Our findings make clear that forgetting is an active process that is probably regulated."

The Two Faces of Dopamine

To better understand the mechanisms for forgetting, Davis and his colleagues studied Drosophila or fruit flies, a key model for studying memory that has been found to be highly applicable to humans. The flies were put in situations where they learned that certain smells were associated with either a positive reinforcement like food or a negative one, such as a mild electric shock. The scientists then observed changes in the flies' brains as they remembered or forgot the new information.

The results showed that a small subset of dopamine neurons actively regulate the acquisition of memories and the forgetting of these memories after learning, using a pair of dopamine receptors in the brain. Dopamine is a neurotransmitter that plays an important role in a number of processes including punishment and reward, memory, learning and cognition.

But how can a single neurotransmitter, dopamine, have two seemingly opposite roles in both forming and eliminating memories? And how can these two dopamine receptors serve acquiring memory on the one hand, and forgetting on the other?

The study suggests that when a new memory is first formed, there also exists an active, dopamine-based forgetting mechanism - ongoing dopamine neuron activity - that begins to erase those memories unless some importance is attached to them, a process known as consolidation that may shield important memories from the dopamine-driven forgetting process.

The study shows that specific neurons in the brain release dopamine to two different receptors known as dDA1 and DAMB, located on what are called mushroom bodies because of their shape; these densely packed

networks of neurons are vital for memory and learning in insects. The study found the dDA1 receptor is responsible for memory acquisition, while DAMB is required for forgetting.

When dopamine neurons begin the signaling process, the dDA1 receptor becomes overstimulated and begins to form memories, an essential part of memory acquisition. Once that memory is acquired, however, these same dopamine neurons continue signaling. Except this time, the signal goes through the DAMB receptor, which triggers forgetting of those recently acquired, but not yet consolidated, memories.

Jacob Berry, a graduate student in the Davis lab who led the experimentation, showed that inhibiting the dopamine signaling after learning enhanced the flies' memory. Hyperactivating those same neurons after learning erased memory. And, a mutation in one of the receptors, dDA1, produced flies unable to learn, while a mutation in the other, DAMB, blocked forgetting.

Intriguing Issues

While Davis was surprised by the mechanisms the study uncovered, he was not surprised that forgetting is an active process. "Biology isn't designed to do things in a passive way," he said. "There are active pathways for constructing things, and active ones for degrading things. Why should forgetting be any different?"

The study also brings into a focus a lot of intriguing issues, Davis said - savant syndrome, for example.

"Savants have a high capacity for memory in some specialized areas," he said. "But maybe it isn't memory that gives them this capacity, maybe they have a bad forgetting mechanism. This also might be a strategy for developing drugs to promote cognition and memory - what about drugs that inhibit forgetting as cognitive enhancers?"

The study was supported by the National Institutes of Health.
The above story is reprinted from materials provided by Scripps Research Institute.
Jacob A. Berry, Isaac Cervantes-Sandoval, Eric P. Nicholas, Ronald L. Davis. Dopamine Is Required for Learning and Forgetting in Drosophila. Neuron, 2012; 74 (3): 530 DOI: 10.1016/j.neuron.2012.04.007

http://phys.org/news/2012-05-archaeologists-lost-language.html

Archaeologists discover lost language

Evidence for a forgotten ancient language which dates back more than 2,500 years, to the time of the Assyrian Empire, has been found by archaeologists working in Turkey.

Researchers working at Ziyaret Tepe, the probable site of the ancient Assyrian city of Tušhan, believe that the language may have been spoken by deportees originally from the Zagros Mountains, on the border of modern-day Iran and Iraq.

In keeping with a policy widely practised across the Assyrian Empire, these people may have been forcibly moved from their homeland and resettled in what is now south-east Turkey, where they would have been set to work building the new frontier city and farming its hinterland.

The evidence for the language they spoke comes from a single clay tablet, which was preserved after it was baked in a fire that destroyed the palace in Tušhan at some point around the end of the 8th century BCE. Inscribed with cuneiform characters, the tablet is essentially a list of the names of women who were attached to the palace and the local Assyrian administration.

Writing in the new issue of the Journal Of Near Eastern Studies, Dr John MacGinnis, from the McDonald Institute for Archaeological Research, University of Cambridge, explains how the nature of these names has piqued the interest of researchers.

“Altogether around 60 names are preserved,” MacGinnis said. “One or two are actually Assyrian and a few more may belong to other known languages of the period, such as Luwian or Hurrian, but the great majority belong to a previously unidentified language.”

“If the theory that the speakers of this language came from western Iran is correct, then there is the potential here to complete the picture of the world’s first multi-ethnic empire. We know from existing texts that the Assyrians did conquer people from that region. Now we know that there is another language, perhaps from the same area, and maybe more evidence of its existence waiting to be discovered.”

Ziyaret Tepe is on the River Tigris in south east Turkey, and has been the subject of extensive archaeological excavations since 1997. Recent work has revealed evidence that it was probably once the site of the Assyrian frontier city of Tušhan. In particular, it is thought that the remains of a monumental building excavated on the site are those of the governor’s palace, built by the Assyrian King Ashurnasirpal II (883 – 859 BCE).

The tablet was found in what may have been the palace’s throne room by Dr Dirk Wicke of the University of Mainz, working as part of a team led by Professor Timothy Matney of the University Akron, Ohio. When a conflagration destroyed the palace, perhaps around the year 700 BCE, the tablet was baked and much of its contents on the obverse side preserved.

MacGinnis was handed the task of deciphering the tablet and has identified a total of 144 names, of which 59 can still be made out. His analysis systematically rules out not only common languages from within the Assyrian Empire, but also other languages of the time – including Egyptian, Elamite, Urartian or West Semitic. Even at its most generous, his assessment suggests that only 15 of the legible names belong to a language previously known to historians.

The report also posits several theories about where this mysterious language may have come from. One notion is that it may be Shubrian – the indigenous language spoken in the Tušhan area before the Assyrians arrived. As far as historians know, Shubrian was never written down. In addition, it is believed to have been a dialect of Hurrian, which is known and does not appear to bear any resemblance to most of the names on the tablet.

Another theory is that it was the language spoken by the Mushki – a people who were migrating to Eastern Anatolia at around the time the tablet was made. This idea seems less plausible, however, as to appear on the list of the Assyrian administration, these people would either have infiltrated the Empire or been captured, and historians have evidence for neither.

More convincing is the theory that the language in question may have been spoken by a people from somewhere else in the Assyrian Empire who were forcibly moved by the administration.

This was standard practice for successive Assyrian Kings, particularly after the Empire began to expand during the 9th century. “It was an approach which helped them to consolidate power by breaking the control of the ruling elite in newly-conquered areas,” MacGinnis said. “If people were deported to a new location, they were entirely dependent on the Assyrian administration for their well-being.”

Although historians already know that the Zagros Mountains were in a region invaded and annexed by the Assyrians, it remains, to date, the one area under Assyrian occupation for which no known language exists. That makes it tempting to link the text on the tablet to the same region. An Assyrian King, Esarhaddon, even referred to an unidentified language, Mekhranian, which supposedly hailed from the Zagros, but in practice the area was probably a patchwork of chiefdoms and more than one dialect may have been in use.

“If correct this suggests that Iran was home to previously unknown languages,” MacGinnis said. “The immediate impression is that the names on this tablet were those of women who belonged to an isolated community. It may be, however, that there were others whom we still have to find out about.”

The tablet is currently being stored in Diyarbakir, Turkey, where it is hoped that it will eventually go on public display. Dr MacGinnis’ report on its decipherment is published in the April issue of the Journal of Near Eastern Studies. *Provided by University of Cambridge*

http://www.eurekalert.org/pub_releases/2012-05/cp-sji050412.php

Social jetlag is a real health hazard

Social jetlag - a syndrome related to the mismatch between the body's internal clock and the realities of our daily schedules - does more than make us sleepy.

It is also contributing to the growing tide of obesity, according to a large-scale epidemiological study reported online on May 10 in Current Biology, a Cell Press publication.

"We have identified a syndrome in modern society that has not been recognized until recently," said Till Roenneberg of the University of Munich. "It concerns an increasing discrepancy between the daily timing of the physiological clock and the social clock. As a result of this social jetlag, people are chronically sleep-deprived. They are also more likely to smoke and drink more alcohol and caffeine. Now, we show that social jetlag also contributes to obesity; the plot that social jetlag is really bad for our health is thickening."

Each of us has a biological clock, he explained. We can't set those clocks according to our whims like watches. They are rather entrained by daylight and night-darkness to provide the optimal window for sleep and waking. In modern society, we listen to those clocks "less and less due to the increasing discrepancy between what the body clock tells us and what the boss tells us."

To find out how big this problem really is, Roenneberg's team is compiling a vast database on human sleeping and waking behavior, which they'll eventually use to produce a world sleep map. Now 10 years into the effort, they already have lots of information, including participants' height, weight, and sleep patterns.

Their analysis shows that people with more severe social jetlag are also more likely to be overweight. In other words, it appears that living "against the clock" may be a factor contributing to the epidemic of obesity, the researchers say.

The findings should weigh in on decisions about Daylight Saving Time, not to mention work and school times, they add. It would also help if people began spending more time outdoors in open daylight or at least

sitting by a window. As people fail to do this for one reason or another, their body clocks get set later and later, leaving them awake into the night and tired by day.

"Waking up with an alarm clock is a relatively new facet of our lives," Roenneberg says. "It simply means that we haven't slept enough and this is the reason why we are chronically tired. Good sleep and enough sleep is not a waste of time but a guarantee for better work performance and more fun with friends and family during off-work times." And slimmer waistlines, too. *Roenneberg et al.: "Social jetlag and obesity."*

http://www.eurekalert.org/pub_releases/2012-05/aps-ctw050812.php

Could the ways animals regenerate hair and feathers lead to clues to restore human fingers and toes?

The latest issue of the journal Physiology contains a review article that looks at possible routes that unlock cellular regeneration

Bethesda, Md. - This summer's action film, "The Amazing Spider-Man™," is another match-up between the superhero and his nemesis the Lizard. Moviegoers and comic book fans alike will recall that the villain, AKA Dr. Curt Connors, was a surgeon who, after losing an arm, experimented with cell generation and reptilian DNA and was eventually able to grow back his missing limb. The latest issue of the journal Physiology contains a review article that looks at possible routes that unlock cellular regeneration in general, and the principles by which hair and feathers regenerate themselves in particular. The authors apply what is currently known about regenerative biology to the emerging field of regenerative medicine, which is being transformed from fantasy to reality.

The Review is entitled "Physiological Regeneration of Skin Appendages and Implications for Regenerative Medicine" and was written by Cheng-Ming Chuong, Randall B. Widelitz, Ping Wu, and Ting-Xin Jiang of the University of Southern California, and Valerie A. Randall of the University of Bradford. It appears in the current edition of Physiology, published by the American Physiological Society.

Review Article

While the concept of regenerative medicine is relatively new, animals are well known to remake their hair and feathers regularly by normal regenerative physiological processes. In their review, the authors focus on (1) how extrafollicular environments can regulate hair and feather stem cell activities and (2) how different configurations of stem cells can shape organ forms in different body regions to fulfill changing physiological needs.

The review outlines previous research on the role of normal regeneration of hair and feathers throughout the lifespan of various birds and mammals. The researchers include what is currently known about the mechanism behind this re-growth, as well as what gaps still exist in the knowledge base and remain ripe for future research.

The review examines dozens of papers on normal "physiological regeneration" - the re-growth that happens over the course of an animal's life and not in response to an injury. This regeneration takes place to accommodate different stages in an animal's life (e.g., replacing downy chick feathers with an adult chicken's, or replacing the fine facial hair of a young boy with the budding beard of an adolescent), or in response to various environmental conditions (e.g., cats shedding a thick winter coat in the summer heat but re-growing it when the seasons change again, or snowshoe hares switching from brown in the summer to white in the winter for camouflage). These changes seem to respond both to internal cues such as physiology of the hair follicle itself, or external cues such as the environment, but the mechanisms behind these normal alterations are largely unknown. Stem cells inside the follicle prompt hair and feather regeneration, but researchers are still unsure how to guide those cells to form the shape, size, and orientation of these "skin appendages" so that controlled re-growth is possible. Additionally, scientists are still unsure how to re-grow hair on skin in people after severe injuries that lead to scar tissue.

Importance of the Findings

The reviewed studies suggest that while researchers are making headway in understanding how and why hair and feathers regenerate after normal loss or in response to different life stages, much still remains unknown. This missing knowledge could hold valuable clues to learning how to regenerate much more complicated and valuable structures after loss to injury, such as fingers and toes.

"Using the episodic regeneration of skin appendages as a clear readout, we have the opportunity to understand and modulate the behavior or adult stem cells and organ regeneration at a level heretofore unknown," the authors say.

The study is available online at http://bit.ly/IGC6mP To request an interview with a member of the research team please contact Donna Krupa at dkrupa@the-aps.org, @Phyziochick, or 301.634.7209.

www.sciencedaily.com/releases/2012/05/120510100217.htm

Free-Floating Planets in the Milky Way Outnumber Stars by Factors of Thousands

Life-Bearing Planets May Exist in Vast Numbers

ScienceDaily - Researchers say life-bearing planets may exist in vast numbers in the space between stars in the Milky Way.

A few hundred thousand billion free-floating life-bearing Earth-sized planets may exist in the space between stars in the Milky Way. So argues an international team of scientists led by Professor Chandra Wickramasinghe, Director of the Buckingham Centre for Astrobiology at the University of Buckingham, UK. Their findings are published online in the Springer journalAstrophysics and Space Science.

The scientists have proposed that these life-bearing planets originated in the early Universe within a few million years of the Big Bang, and that they make up most of the so-called "missing mass" of galaxies. The scientists calculate that such a planetary body would cross the inner solar system every 25 million years on the average and during each transit, zodiacal dust, including a component of the solar system's living cells, becomes implanted at its surface. The free-floating planets would then have the added property of mixing the products of local biological evolution on a galaxy-wide scale.

Since 1995, when the first extrasolar planet was reported, interest in searching for planets has reached a feverish pitch. The 750 or so detections of exoplanets are all of planets orbiting stars, and very few, if any, have been deemed potential candidates for life. The possibility of a much larger number of planets was first suggested in earlier studies where the effects of gravitational lensing of distant quasars by intervening planet-sized bodies were measured. Recently several groups of investigators have suggested that a few billion such objects could exist in the galaxy. Wickramasinghe and team have increased this grand total of planets to a few hundred thousand billion (a few thousand for every Milky Way star) - each one harbouring the legacy of cosmic primordial life.

N. Chandra Wickramasinghe, Jamie Wallis, Daryl H. Wallis, Rudolph E. Schild, Carl H. Gibson. Life-bearing primordial planets in the solar vicinity. Astrophysics and Space Science, 2012; DOI: 10.1007/s10509-012-1092-8

http://www.sciencedaily.com/releases/2012/05/120510113348.htm

Reducing Brain Activity Improves Memory After Cognitive Decline

A study suggests a potential new therapeutic approach for improving memory and interrupting disease progression

ScienceDaily - A study led by a Johns Hopkins neuroscientist and published in the May 10 issue of the journal Neuron suggests a potential new therapeutic approach for improving memory and interrupting disease progression in patients with a form of cognitive impairment that often leads to full-blown Alzheimer's disease.

The focus of the study was "excess brain activity" commonly associated with conditions that cause mild cognitive decline and memory loss, and are linked to an increased risk of Alzheimer's. Previously, it had been thought that this neural hyperactivity in the hippocampus was the brain's attempt to compensate for a weakness in forming new memories. Instead, the team found that this excess activity is contributing to conditions such as amnestic mild cognitive impairment (aMCI), in which patients' memories are worse than would be expected in healthy people the same age.

"In the case of aMCI, it has been suggested that the increased hippocampal activation may serve a beneficial function by recruiting additional neural 'resources' to compensate for those that are lost," explains lead author Michela Gallagher, the Krieger-Eisenhower Professor of Psychological and Brain Sciences in the Johns Hopkins University's Krieger School of Arts and Sciences. "However, animal studies have raised the alternative view that this excess activation may be contributing to memory impairment."

To test how a reduction in that hippocampal activity would affect human patients with aMCI, Gallagher's team administered a low dose of a drug clinically used to treat epilepsy. The goal was to reduce the test subjects' activity to levels that were similar to those of healthy, age-matched subjects in a control group. They used functional magnetic resonance imaging both to determine the levels of excess activity, and the reduction of it by way of the drug.

Gallagher and her team found that those subjects who had been treated with an effective dose of the drug did better on a memory task, pointing to the therapeutic potential of reducing this excess activation of the hippocampus in patients with aMCI. These findings in human patients with aMCI are the first to clinically demonstrate that over activity in the hippocampus has no benefit for cognition, and are consistent with Gallagher's research in an animal model of memory loss: aged rodents.

The findings may have broad clinical implications because increased hippocampal activation occurs not only in patients with aMCI, but also in other conditions of risk, such as familial Alzheimer's disease (AD).

Research in mouse models of familial AD conducted at the Gladstone Institutes of San Francisco has identified mechanisms of the brain that contribute to abnormal excitatory brain activity, as reported in a paper published in the April 27 issue of the journal Cell. In addition, the results of other studies in mice using the same drug used in aMCI patients were presented at last year's International Congress on Alzheimer's disease in Paris, showing both improved memory performance and neuronal function in the hippocampus.

"From both a scientific and clinical perspective, I am thrilled about the consistency of findings obtained in aMCI patients and related animal models," said Lennart Mucke, director of the Gladstone Institute of Neurological Disease and professor of neurology and neuroscience at the University of California San Francisco.

According to Gallagher, the elevated hippocampal activity observed in conditions that precede AD may be one of the underlying mechanisms contributing to neurodegeneration and memory loss. Studies have found that if patients with aMCI are followed for a number of years, those with the greatest excess activation have the greatest further decline in memory, and are more likely to receive a diagnosis of Alzheimer's over the next four to six years.

"Apart from a direct role in memory impairment, there is concern that elevated activity in vulnerable neural networks could be causing additional damage and possibly promoting the widespread disease-related degeneration that underlies cognitive decline and the conversion to Alzheimer's disease," says Gallagher. "Therefore, reducing the elevated activity in the hippocampus may help to restore memory and protect the brain. It will require a carefully monitored, lengthier clinical trial to determine if that is the case."

The team that conducted the Johns Hopkins study included Arnold Bakker, Greg Krauss, Marilyn Albert, Carolyn Speck, Lauren Jones, Michael Yassa, Amy Shelton and Susan Bassett. The team also included Craig Stark of the University of California at Irvine.

The research was supported by the National Institutes of Health.

Arnold Bakker, Gregory L. Krauss, Marilyn S. Albert, Caroline L. Speck, Lauren R. Jones, Craig E. Stark, Michael A. Yassa, Susan S. Bassett, Amy L. Shelton, Michela Gallagher. Reduction of Hippocampal Hyperactivity Improves Cognition in Amnestic Mild Cognitive Impairment. Neuron, 2012; 74 (3): 467 DOI: 10.1016/j.neuron.2012.03.023

http://phys.org/news/2012-05-disposable-paper-based-pads.html

Researchers develop disposable paper-based touch pads

A team of researchers have developed paper-based electronic touch pads that cost just 25 cents per square meter

Phys.org - Today, electronic touch pads are widely found on laptops, tablets, and other computing devices. Less common uses, but gaining in popularity, are book covers and food labels. These and other low-tech applications become possible as touch pads become extremely inexpensive, with applications ranging from beer bottle labels to disposable medical device labels. Now a team of researchers from the US and France have developed paper-based electronic touch pads that cost just 25 cents per square meter, a price at which touch pads can simply be thrown away when no longer needed.

The touch pads are made of metallized paper, which is paper coated in aluminum and transparent polymer. The paper can function as a capacitor, and a laser can be used to cut several individual capacitors in the paper, each corresponding to a key on the touch pad. When a person touches a key, the key’s capacitance is increased. Once the keys are linked to external circuitry and a power source, the system can detect when a key is touched by detecting the increased capacitance.

According to lead researcher Aaron Mazzeo of Harvard University, the next steps will be finding a power source and electronics that are cheap, flexible, and disposable.

Among the applications, inexpensive touch pads could be used for security purposes. The researchers have already developed a box with an alarm and keypad that requires a code to allow authorized access. Disposable touch pads could also be useful in sterile or contaminated medical environments.

More information: Aaron Mazzeo, et al. "Paper-Based, Capacitive Touch Pads." DOI: 10.1002/adma.201200137

http://www.sciencedaily.com/releases/2012/05/120510224957.htm

Asteroid Vesta Looks Like a Little Planet, Complete With Craters, Mountains and Landslides

When UCLA's Christopher T. Russell looks at the images of the protoplanet Vesta produced by NASA's Dawn mission, he talks about beauty as much as he talks about science

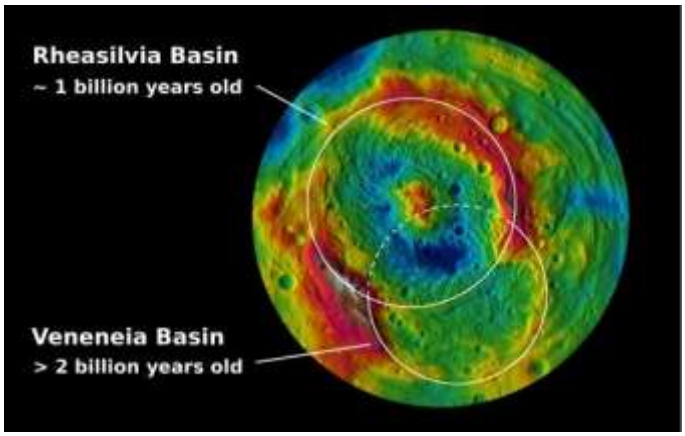
ScienceDaily - "Vesta looks like a little planet. It has a beautiful surface, much more varied and diverse than we expected," said Russell, a professor in UCLA's Department of Earth and Space Sciences and the Dawn mission's principal investigator. "We knew Vesta's surface had some variation in color, but we did not expect

the diversity that we see or the clarity of the colors and textures, or their distinct boundaries. We didn't find gold on Vesta, but it is still a gold mine."

Dawn has been orbiting Vesta and collecting data on the protoplanet's surface since July 2011. Vesta, which is in the doughnut-shaped asteroid belt between Mars and Jupiter, is currently some 321 million miles from Earth.

The journal Science publishes six papers about Vesta on May 11. Russell is a co-author on all of them.

Russell and his scientific team expected to find a large crater on Vesta, but they were surprised to find two, with the larger one essentially on top of the smaller. The smaller crater covers roughly the distance from Los Angeles to Monterey, Calif.; the larger one would stretch from L.A. to San Francisco.



This colorized map from NASA's Dawn mission shows the distribution of minerals across the surface of Vesta. It was made from spectra –- data collected in different wavelengths of radiation –- obtained by Dawn's visible and infrared mapping spectrometer. **Credit: NASA/JPL-Caltech/UCLA/INAF/MPS/DLR/IDA**

"When we got to Vesta, we found two very large impacts, both in the southern region," Russell said. "One dates at about a billion years ago, and the other at least 2 billion years ago. Seeing two was a real discovery, and getting their ages is even better. The ages look like they correspond to the dates when we think rocks were blasted off Vesta; some came all the way to Earth. The large size of the craters can easily account for the material that came off, to fall as meteorites and many smaller 'Vestoids' that are like very large boulders."

Many of the so-called Vestoids are approximately one-half mile to five miles across, and there may be thousands of them throughout the asteroid belt, Russell said. Named for the ancient Roman goddess of the hearth, Vesta has been bombarded by comets, meteoroids and its smaller siblings for 4.5 billion years.

Among the other new discoveries reported in Science:

Vesta has large mountains - the largest is more than twice the size of Mount Everest - which were formed by a major impact to the protoplanet's surface. Scientists thought most of Vesta outside the south polar region might be flat like the moon, yet some of the craters outside that region formed on very steep slopes and have nearly vertical sides, with landslides often occurring in the regolith, the deep layer of crushed rock on the surface.

The Dawn mission has witnessed a pattern of minerals exposed by deep gashes created by space-rock impacts to Vesta. This might support the idea that Vesta was once molten inside and had a sub-surface magma ocean.

Vesta has an iron core, formed during the period in which the protoplanet was molten, at the earliest epoch of the solar system; Dawn's measurements of Vesta's gravitational field have confirmed this. This finding was expected because meteorites from Vesta have less iron than the solar nebula from which planetary building blocks formed. That the iron is indeed sequestered in Vesta's core confirms thinking that Vesta separated into layers when it formed, and this starting composition allows scientists to constrain early solar system models.

Vesta's surface contains many bright spots of varying size. A real surprise is that Vesta also has some areas as dark as coal. The dark and light markings form intricate patterns suggesting the dominance of impact processes in creating mixed layers in Vesta's regolith.

"It looks like an artist has painted the craters in fancy patterns," Russell said. "It is beautiful, and surprising."

Dawn has obtained more than 20,000 images of Vesta and millions of spectra, or data collected from different wavelengths of radiation. "Everything is working," Russell said proudly.

Studies of meteorites found on Earth that are linked to Vesta suggest that Vesta formed from interstellar gas and dust during the solar system's first 2 to 5 million years. "Vesta has been recording the history of the solar system from the beginning," Russell said. "We are going back to the beginning of the solar system - more than 4.5 billion years ago. We're going back further than ever before on the surface of a body." New images and videos of Vesta are available at www.nasa.gov/mission_pages/dawn/news/dawn20120510.html.

The Dawn mission, which launched in September 2007, has been as close as 125 miles from the surface of Vesta, which has an average diameter of approximately 330 miles.

Dawn has a high-quality camera, along with a back-up; a visible and near-infrared mapping spectrometer to identify minerals on the surface; and a gamma ray and neutron spectrometer to reveal the abundance of

elements such as iron and hydrogen, possibly from water, in the soil. Dawn also probes Vesta's gravity using extremely precise navigation.

The study of Vesta, however, is only half of Dawn's mission. The spacecraft will also conduct a detailed study of the structure and composition of the dwarf planet Ceres. Vesta and Ceres are the most massive objects in the main asteroid belt between Mars and Jupiter. Dawn's goals include determining the shape, size, composition, internal structure, and tectonic and thermal evolution of both objects, and the mission is expected to reveal the conditions under which each of them formed.

Dawn, the second scientific mission to be powered by an advanced NASA technology known as ion propulsion, is the first NASA mission to orbit two solar system targets beyond the moon.

After orbiting Vesta, Dawn will leave for its nearly three-year journey to Ceres, which could harbor substantial water or ice beneath its rock crust - and possibly life. The spacecraft will rendezvous with Ceres and begin orbiting in 2015, conducting studies and observations for at least five months.

"I want to squeeze every last image out of Vesta before we leave," Russell said. "We will be analyzing Vesta's surface properties at least until we get to Ceres."

The Dawn mission is managed by the Jet Propulsion Laboratory (JPL), a division of the California Institute of Technology in Pasadena, Calif., for NASA's Science Mission Directorate. Team members include scientists from JPL, the NASA Goddard Space Flight Center, the Planetary Science Institute, the Massachusetts Institute of Technology and other institutions.

Scientific partners include the Max Planck Institute for Solar System Research in Katlenburg, Germany; the DLR Institute for Planetary Research in Berlin; the Freie Universitaet in Berlin; the Italian National Institute for Astrophysics in Rome; and the Italian Space Agency. Orbital Sciences Corp. of Dulles, Va., designed and built the Dawn spacecraft.

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http://bit.ly/JffxBi

Dept. of Energy extracts fuel from the sea floor

Methane taken from the seabed, replaced by carbon dioxide.

by John Timmer - May 3 2012, 5:30am TST

Today, the US Department of Energy announced it had successfully completed a test project that extracted a usable fuel (methane) from its resting place in ocean sediments. The test, performed in conjunction with ConocoPhillips and a Japanese team, could potentially point the way toward a vast new supply of energy. And by linking the extraction with carbon sequestration, the DOE might have found a way to add more hydrocarbons to the world's energy budget without exacerbating climate change.

The material in question is methane hydrates (also called clathrates). These form at high pressure in water, which forms a cage-like structure around pockets of methane. Although these remain solid even above the

freezing point of water, changes in pressure and temperature can melt them, releasing methane and returning the water to a liquid state. Clathrate deposits are estimated to be massive. If they can be extracted successfully, they would add a significant boost to the world's hydrocarbon reserves.

The recently completed project, which took place off the coast of Alaska, is a test to determine if we can do that. The extraction technique involves lowering the pressure at the site of the deposit, allowing the methane to escape. At the same time, liquid CO2 was pumped in to occupy the space that held the clathrate. At the pressures prevalent at the site, the CO2 should remain liquid.

There are some big questions that will require followup work - does the process release methane that escapes into the atmosphere? Does the CO2 remain in place long enough that we can consider it sequestered? To get answers to those questions, the DOE has allocated another $6.5 million to further tests, and is requesting $5 million in next year's budget.

http://www.eurekalert.org/pub_releases/2012-05/vfi-vkn051112.php

Vitamin K2: New hope for Parkinson's patients?

Neuroscientist Patrik Verstreken, associated with VIB and KU Leuven, succeeded in undoing the effect of one of the genetic defects that leads to Parkinson's using vitamin K2.

His discovery gives hope to Parkinson's patients. This research was done in collaboration with colleagues from Northern Illinois University (US) and will be published this evening on the website of the authorative journal Science.

"It appears from our research that administering vitamin K2 could possibly help patients with Parkinson's. However, more work needs to be done to understand this better," says Patrik Verstreken.

Malfunctioning power plants are at the basis of Parkinson's.

If we looked at cells as small factories, then mitochondria would be the power plants responsible for supplying the energy for their operation. They generate this energy by transporting electrons. In Parkinson's patients, the activity of mitochondria and the transport of electrons have been disrupted, resulting in the mitochondria no longer producing sufficient energy for the cell. This has major consequences as the cells in certain parts of the brain will start dying off, disrupting communication between neurons. The results are the typical symptoms of Parkinson's: lack of movement (akinesia), tremors and muscle stiffness.

The exact cause of this neurodegenerative disease is not known. In recent years, however, scientists have been able to describe several genetic defects (mutations) found in Parkinson's patients, including the so-called PINK1 and Parkin mutations, which both lead to reduced mitochondrial activity. By studying these mutations, scientists hope to unravel the mechanisms underlying the disease process.

Paralyzed fruit flies

Fruit flies (Drosophila) are frequently used in lab experiments because of their short life spans and breeding cycles, among other things. Within two weeks of her emergence, every female is able to produce hundreds of offspring. By genetically modifying fruitflies, scientists can study the function of certain genes and proteins. Patrik Verstreken and his team used fruitflies with a genetic defect in PINK1 or Parkin that is similar to the one associated with Parkinson's. They found that the flies with a PINK1 or Parkin mutation lost their ability to fly.

Upon closer examination, they discovered that the mitochondria in these flies were defective, just as in Parkinson's patients. Because of this they generated less intracellular energy – energy the insects needed to fly. When the flies were given vitamin K2, the energy production in their mitochondria was restored and the insects' ability to fly improved. The researchers were also able to determine that the energy production was restored because the vitamin K2 had improved electron transport in the mitochondria. This in turn led to improved energy production.

Conclusion

Vitamin K2 plays a role in the energy production of defective mitochondria. Because defective mitochondria are also found in Parkinson's patients with a PINK1 or Parkin mutation, vitamin K2 potentially offers hope for a new treatment for Parkinson's.

http://www.eurekalert.org/pub_releases/2012-05/vcu-mtb051112.php

Mild traumatic brain injury may contribute to brain network dysfunction

Even mild head injuries can cause significant abnormalities in brain function that last for several days

RICHMOND, Va. – Even mild head injuries can cause significant abnormalities in brain function that last for several days, which may explain the neurological symptoms experienced by some individuals who have experienced a head injury associated with sports, accidents or combat, according to a study by Virginia Commonwealth University School of Medicine researchers.

These findings, published in the May issue of the Journal of Neuroscience, advance research in the field of traumatic brain injury (TBI), enabling researchers to better understand what brain structural or functional changes underlie posttraumatic disorders – a question that until now has remained unclear.

Previous research has shown that even a mild case of TBI can result in long-lasting neurological issues that include slowing of cognitive processes, confusion, chronic headache, posttraumatic stress disorder and depression.

The VCU team, led by Kimberle M. Jacobs, Ph.D. , associate professor in the Department of Anatomy and Neurobiology , demonstrated for the first time, using sophisticated bioimaging and electrophysiological approaches, that mild injury can cause structural disruption of axons in the brain while also changing the way the neurons fire in areas where they have not been structurally altered. Axons are nerve fibers in the brain responsible for conducting electrical impulses. The team used models of mild traumatic brain injury and followed morphologically identified neurons in live cortical slices.

"These findings should help move the field forward by providing a unique bioimaging and electrophysiological approach to assess the evolving changes evoked by mild TBI and their potential therapeutic modulation," said co-investigator, John T. Povlishock, Ph.D. , professor and chair of the VCU School of Medicine's Department of Anatomy and Neurobiology and director of the Commonwealth Center for the Study of Brain Injury.

According to Povlishock, additional benefit may also derive from the use of this model system with repetitive injuries to determine if repeated insults exacerbate the observed abnormalities.

The work was supported in part by grants from the National Institutes of Health, grant numbers: NS077675, HD055813, NS047463, and NS007288.

http://www.eurekalert.org/pub_releases/2012-05/dnl-lnc051112.php

Low-cost nanosheet catalyst discovered to split hydrogen from water

Non-noble electrocatalyst efficiently generates hydrogen gas without platinum

UPTON, NY – Hydrogen gas offers one of the most promising sustainable energy alternatives to limited fossil fuels. But traditional methods of producing pure hydrogen face significant challenges in unlocking its full potential, either by releasing harmful carbon dioxide into the atmosphere or requiring rare and expensive chemical elements such as platinum.

Now, scientists at the U.S. Department of Energy's (DOE) Brookhaven National Laboratory have developed a new electrocatalyst that addresses one of these problems by generating hydrogen gas from water cleanly and with much more affordable materials. The novel form of catalytic nickel-molybdenum-nitride – described in a paper published online May 8, 2012 in the journal Angewandte Chemie International Edition – surprised scientists with its high-performing nanosheet structure, introducing a new model for effective hydrogen catalysis.

"We wanted to design an optimal catalyst with high activity and low costs that could generate hydrogen as a high-density, clean energy source," said Brookhaven Lab chemist Kotaro Sasaki, who first conceived the idea for this research. "We discovered this exciting compound that actually outperformed our expectations."

Goldilocks chemistry

Water provides an ideal source of pure hydrogen – abundant and free of harmful greenhouse gas byproducts. The electrolysis of water, or splitting water (H_2O) into oxygen (O_2) and hydrogen (H_2), requires external electricity and an efficient catalyst to break chemical bonds while shifting around protons and electrons. To justify the effort, the amount of energy put into the reaction must be as small as possible while still exceeding the minimum required by thermodynamics, a figure associated with what is called overpotential.

For a catalyst to facilitate an efficient reaction, it must combine high durability, high catalytic activity, and high surface area. The strength of an element's bond to hydrogen determines its reaction level – too weak, and there's no activity; too strong, and the initial activity poisons the catalyst.

"We needed to create high, stable activity by combining one non-noble element that binds hydrogen too weakly with another that binds too strongly," said James Muckerman, the senior chemist who led the project. "The result becomes this well-balanced Goldilocks compound – just right."

Unfortunately, the strongest traditional candidate for an electrocatlytic Goldilocks comes with a prohibitive price tag.

Problems with platinum

Platinum is the gold standard for electrocatalysis, combining low overpotential with high activity for the chemical reactions in water-splitting. But with rapidly rising costs – already hovering around $50,000 per kilogram – platinum and other noble metals discourage widespread investment.

"People love platinum, but the limited global supply not only drives up price, but casts doubts on its long-term viability," Muckerman said. "There may not be enough of it to support a global hydrogen economy."

In contrast, the principal metals in the new compound developed by the Brookhaven team are both abundant and cheap: $20 per kilogram for nickel and $32 per kilogram for molybdenum. Combined, that's 1000 times less expensive than platinum. But with energy sources, performance is often a more important consideration than price.

Turning nickel into platinum

In this new catalyst, nickel takes the reactive place of platinum, but it lacks a comparable electron density. The scientists needed to identify complementary elements to make nickel a viable substitute, and they introduced metallic molybdenum to enhance its reactivity. While effective, it still couldn't match the performance levels of platinum.

"We needed to introduce another element to alter the electronic states of the nickel-molybdenum, and we knew that nitrogen had been used for bulk materials, or objects larger than one micrometer," said research associate Wei-Fu Chen, the paper's lead author. "But this was difficult for nanoscale materials, with dimensions measuring billionths of a meter."

The scientists expected the applied nitrogen to modify the structure of the nickel-molybdenum, producing discrete, sphere-like nanoparticles. But they discovered something else.

Subjecting the compound to a high-temperature ammonia environment infused the nickel-molybdenum with nitrogen, but it also transformed the particles into unexpected two-dimensional nanosheets. The nanosheet structures offer highly accessible reactive sites – consider the surface area difference between bed sheets laid out flat and those crumpled up into balls – and therefore more reaction potential.

Using a high-resolution transmission microscope in Brookhaven Lab's Condensed Matter Physics and Materials Science Department, as well as x-ray probes at the National Synchrotron Light Source, the scientists determined the material's 2D structure and probed its local electronic configurations.

"Despite the fact that metal nitrides have been extensively used, this is the first example of one forming a nanosheet," Chen said. "Nitrogen made a huge difference – it expanded the lattice of nickel-molybdenum, increased its electron density, made an electronic structure approaching that of noble metals, and prevented corrosion."

Hydrogen future

The new catalyst performs nearly as well as platinum, achieving electrocatalytic activity and stability unmatched by any other non-noble metal compounds. "The production process is both simple and scalable," Muckerman said, "making nickel-molybdenum-nitride appropriate for wide industrial applications."

While this catalyst does not represent a complete solution to the challenge of creating affordable hydrogen gas, it does offer a major reduction in the cost of essential equipment. The team emphasized that the breakthrough emerged through fundamental exploration, which allowed for the surprising discovery of the nanosheet structure.

"Brookhaven Lab has a very active fuel cell and electrocatalysis group," Muckerman said. "We needed to figure out fundamental approaches that could potentially be game-changing, and that's the spirit in which we're doing this work. It's about coming up with a new paradigm that will guide future research."

Additional collaborators on this research were: Anatoly Frenkel of Yeshiva University, Nebojsa Marinkovic of the University of Delaware, and Chao Ma, Yimei Zhu and Radoslav Adzic of Brookhaven Lab.

The research was funded by Brookhaven's Laboratory Directed Research and Development (LDRD) Program. The National Sychrotron Light Source and other Brookhaven user facilities are supported by the DOE Office of Science.

Scientific Paper: "Hydrogen-Evolution Catalysts Based on Non-Nobel Metal Nickel–Molybdenum Nitride Nanosheets" http://onlinelibrary.wiley.com/doi/10.1002/anie.201200699/abstract

http://phys.org/news/2012-05-isu-economists-iowa-years-wal-mart.html

ISU economists study Iowa communities 15 years before and after Wal-Mart

Small towns in Iowa that have hosted Wal-Mart stores showed moderate increases in total retail sales in the 15 years following the stores' opening

Phys.org - Small towns in Iowa (between 3,000 and 20,000 population) that have hosted Wal-Mart stores showed moderate increases in total retail sales in the 15 years following the stores' opening according to a new study by two Iowa State University economists.

Control communities in the study - those without Wal-Mart stores - didn't match the retail sales growth of the Wal-Mart host towns, but their sales also largely stabilized during the same 15-year period. The study will be published in a future issue of Economic Development Quarterly.

"Revisiting Wal-Mart's Impact on Iowa Small Town Retail: Twenty-Five Years Later," was co-authored by Ken Stone, an Iowa State emeritus economics professor; and Georgeanne Artz, a visiting assistant professor of economics in ISU's College of Agriculture and Life Sciences. They've been studying the economic impact of Wal-Mart stores dotting the Iowa landscape since 1988.

Host towns become regional trade centers

"This is a much longer-term study and it shows that among the Wal-Mart host towns, their total sales went up and stabilized, and they became more of the regional trade centers," said Stone, one of the nation's leading experts on the economic impact of Wal-Mart in small towns. "But one has to keep in mind that most of that gain was by Wal-Mart stores, and they did have negative impacts on a lot of other businesses in town - mainly any store that was selling essentially the same thing they were selling.

"The few towns in our population group that don't have a Wal-Mart store fared better than I had expected," he continued. "They too were declining [in retail sales] before Wal-Mart came in, but they kind of stabilized at that lower level from Wal-Mart. And I think it's because nearly all of them got a regional chain store like an ALCO, or a Dollar General. And in particular, I think every one of them had a good chain grocery store like Fareway or HyVee. So again, they sort of had a critical mass of retail stores to retain people there and it's my contention that most people don't really want to drive any farther than they have to to shop."

The smallest towns in the state experienced substantial retail losses during the period, according to the study. For example, Stone reports retail sales in towns below 2,500 population declined 30 percent during the post Wal-Mart era, or about $1.5 billion in current dollars.

The ISU researchers used data obtained from the Iowa Retail Sales and Use Tax Reports, published annually by the Iowa Department of Revenue and Finance, in their analysis of 28 Wal-Mart host towns and 22 control (non-Wal-Mart) towns. "It's important to note that we picked a group of control towns that looked most like the host towns before Wal-Mart came in, so it's not every other town in the state," Artz said. "It's a select group [of towns] we thought were feasible sites for Wal-Mart, but didn't get a Wal-Mart."

In the 15 years following the Wal-Mart opening, the general merchandise (GM) category sector in host towns showed a sharp increase in sales, while the control towns saw a slight decrease in GM sales. The researchers point out that Wal-Mart stores are classified as general merchandise stores, so they generated most of the host towns' GM sales.

Niche merchandise still sells

The study also reports that host town stores that sold niche merchandise - such as specialty retailers, service firms and apparel shops - showed some positive sales increases in the post Wal-Mart era. Conversely, host town stores that sold merchandise similar to Wal-Mart's experienced a sales decline, at least initially.

"Many of the types of stores that were impacted negatively initially seemed to find their way and figure out how to operate against Wal-Mart as time went on," Stone said. "As an example, the old line hardware stores back in the 1980s sold toys and sporting goods, too. They tried to be a general store. And that just didn't work against Wal-Mart because they were dominant in toys and sporting goods, etc. But the hardware chains in particular - and I did a lot of work [consulting] for True Value and Ace - finally learned that they had to specialize and find niches. And the first niche was service. They gave better service."

The researchers point out that Wal-Mart's entry into Iowa coincided with significant geographic shifts in the location of retail trade toward larger cities and regional trade centers within the state.

"I think in almost every case, sales were declining in these smaller towns before Wal-Mart came in - primarily because the bigger cities in Iowa had just built new shopping malls," Stone said. "So they were trending downward, but once Wal-Mart came in, they turned that around and sort of stabilized their sales."

Stone says the study's findings also suggest policy issues that local officials and business people may want to consider - specifically the merits of allowing a big box store to build in a town and whether or not to offer financial incentives. *Provided by Iowa State University*

http://phys.org/news/2012-05-internet-safe-domain.html

Internet safe spot planned at ".secure" domain

Internet security specialists have applied for a ".secure" domain that they plan to turn into an online safe zone where bad guys aren't allowed.

San Francisco-based Artemis was awaiting word Friday from the Internet Corporation for Assigned Names and Numbers (ICANN) on whether it was approved to host websites with ".secure" addresses.

"We are creating a safe neighborhood where you know people follow the rules and you can rely on them to do things securely," Artemis chief technical officer Alex Stamos told AFP. "There is not going to be typo

squatting or malware... We are going to make it really air tight so even if you were in Syria the Syrian government couldn't hijack you."

Commonly available, but typically unused, technology tools for thwarting online hackers, viruses, snoops, spies and scammers will be mandatory at websites with .secure addresses.

"The idea is to make it effortlessly secure for individuals," Stamos said. "In the end, the actual technical security tactics are things (websites) should be doing anyway. We are just making it a requirement."

Plans for .secure were part of an Internet domain name "revolution" that remained on hold due to a flaw that let some aspiring applicants peek at unauthorized information at the ICANN registration website.

ICANN intends to resume taking applications on May 22 from those interested in running new generic top-level domains (gTLDs) online, with the window staying open for about five days. ICANN said that it has so far received 2,091 applications from 1,268 organizations, some of which are vying for the same word as the end to a domain name. In January, ICANN began taking applications from those interested in operating Internet domains that replace endings such as .com or .org with nearly any acceptable words, including company, organization or city names.

Outgoing ICANN president Rod Beckstrom has championed the change as a "new domain name system revolution."

Shifty characters are bound to take advantage of the change by "squatting" on website addresses based on popular words or on common misspellings, according to Stamos. "There are all kinds of shenanigans people pull with domain names," Stamos said. "There will be all kinds of people squatting over the domain space and we are just not going to let that happen." Businesses registering .secure websites will be required to verify their identity and accurately represent what they do. "If you use the word 'bank' or 'brokerage,' you will have to prove that is what you are," Stamos said. "You can't just grab that domain and sit on it."

Those running .secure websites would need to install safeguards, such as data encryption and guard against viruses that could be passed on to visitors. "If you launch a website and two days later there is malware on it, we are taking it down and you will have to come to us and explain," Stamos said.

Artemis did not disclose how much it planned to charge for .secure Web addresses, but expected the amount to be significantly more than the $13 or so typically charged for .com.

Registering a gTLD with ICANN costs $185,000 with a $25,000 annual fee after that.

Artemis, part of Britain-based NCC Group, also had to show ICANN that it could operate .secure for three years without taking in any revenue. The hope was to have .secure among the first wave of new gTLDs, which are expected to go live on the Internet in the middle of next year. "If companies go through a little bit of pain to run on .secure, in the end they have done themselves and their customers a great service," Stamos said. "If you want to be lazy, you should not apply for a .secure domain." More information about .secure was available online at artemis.net. Artemis is also assembling an industry group to develop "domain policy framework" for making websites safer no matter what their addresses.

http://nyti.ms/JmBZxK

Cutbacks Hurt a State's Response to Whooping Cough

Whooping cough, or pertussis, a highly infectious respiratory disease once considered doomed by science, has struck Washington State this spring with a severity that health officials say could surpass the toll of any year since the 1940s, before a vaccine went into wide use.

By KIRK JOHNSON

MOUNT VERNON, Wash. - Although no deaths have been reported so far this year, the state has declared an epidemic and public health officials say the numbers are staggering: 1,284 cases through early May, the most in at least three decades and 10 times last year's total at this time, 128.

The response to the epidemic has been hampered by the recession, which has left state and local health departments on the front lines of defense weakened by years of sustained budget cuts.

Here in Skagit County, about an hour's drive north of Seattle - the hardest-hit corner of the state, based on pertussis cases per capita - the local Public Health Department has half the staff it did in 2008. Preventive care programs, intended to keep people healthy, are mostly gone.

The county's top medical officer, Dr. Howard Leibrand, who is also a full-time emergency room physician, said that in the crushing triage of a combined health crisis and budget crisis, he had gone so far as to urge local physicians to stop testing patients to confirm a whooping cough diagnosis.

If the signs are there, he said - especially a persistent, deep cough and indication of contact with a confirmed victim - doctors should simply treat patients with antibiotics. The pertussis test can cost up to $400 and delay

treatment by days. About 14.6 percent of Skagit County residents have no health insurance, according to a state study conducted last year, up from 11.6 percent in 2008.

"There has been half a million dollars spent on testing in this county," Dr. Leibrand said late last week. "Do you know how much vaccination you can buy for half a million dollars?" And testing, he added, benefits only the epidemiologists, not the patients. "It's an outrageous way to spend your health care dollar."

State health officials estimate that because of incomplete testing and the assumption that many people with mild cases are not seeking medical treatment, perhaps as few as one in five pertussis cases is being recorded and tracked, suggesting that the outbreak is far more widespread than the numbers indicate.

Pertussis was once a dreaded disease of childhood - killing 5,000 to 10,000 Americans a year from the 1920s through the 1940s - but is now a risk mostly to infants, to whom it is fatal in about 1 percent of cases. Most of the victims in Washington, as in previous outbreaks in other states, are between 8 and 12.

"It's the largest epidemic I've ever seen," said Becky Neff, the only registered nurse in the 3,700-student Burlington-Edison School District, in Skagit County. Ms. Neff said she had seen 142 suspected and confirmed cases, or about 3.8 percent of the student population from kindergarten through 12th grade. But with only two nurses processing the disease reports she sends over to the county, down from five a few years ago, Ms. Neff said she had stopped even trying to ask for confirmation. "They don't have time to call and say who's positive and who's negative," she said.

The pertussis vaccine is commonly given in childhood, and many states require it for children of school age. But Washington State, according to a federal study last year of kindergarten-age children, had the highest percentage of parents in the nation who voluntarily exempted their children from one or more vaccines, out of fear of side effects or for philosophical reasons.

So-called underimmunization - in which children do not get the full series of vaccinations - could also be a factor in compounding the outbreak, said Mary Selecky, Washington State's secretary of health.

Last year, the Washington Legislature passed a law requiring parents to prove that they had consulted a physician before declining vaccinations for their children. "We had the easiest opt-out law in the nation until last year, so what we also had was the highest percent of parents opting out," Ms. Selecky said.

Officials at the federal Centers for Disease Control and Prevention, which sent three epidemiologist investigators to Washington last week, said the number of pertussis cases had been rising gradually nationwide for several decades, with periodic regional outbreaks. In 2010, California had its worst bout with pertussis in decades.

Dr. Thomas Clark, an epidemiologist at the C.D.C., said changes in the vaccine may be partly responsible. The formula was altered beginning in the early 1990s to reduce side effects, which means that its immunizing effects do not last as long, he said.

Most of the victims in the Washington outbreak and other recent ones received their early childhood vaccinations, Dr. Clark said. An early immunization, even if it does not keep a patient from getting the illness, generally produces a milder case, he said, since the victim would still have some residual resistance.

Ms. Selecky said immunizations were meant to protect not only individuals but also the broader population: the so-called herd immunity threshold. If a large enough segment of the population is unprotected from a disease - generally considered 5 percent to 15 percent, depending on the disease - even people with some degree of immunity through vaccination can have an elevated risk, she said.

Before the law was passed, Washington's vaccination exemption rate was more than 6 percent.

But the drumbeat of publicity about the pertussis outbreak could be changing some minds.

Mary Ann Mercer, 74, a retired schoolteacher, went to Skagit County's walk-in clinic on Thursday morning for a vaccination after hearing news reports. She never had whooping cough as a child, she said, and never thought of it much until recently. "It's just precautionary," she said after receiving her shot.

Her husband, Roger Mercer, who ran a local Blue Cross insurance plan before his retirement, sat anchored to his chair in the waiting area. "I'm a coward," he said.

http://www.eurekalert.org/pub_releases/2012-05/sumc-nt050912.php

New type of retinal prosthesis could better restore sight to blind, Stanford study says

Using tiny solar-panel-like cells surgically placed underneath the retina, scientists at the Stanford University School of Medicine have devised a system that may someday restore sight to people who have lost vision because of certain types of degenerative eye diseases.

STANFORD, Calif. - This device - a new type of retinal prosthesis - involves a specially designed pair of goggles, which are equipped with a miniature camera and a pocket PC that is designed to process the visual data stream. The resulting images would be displayed on a liquid crystal microdisplay embedded in the goggles, similar to

what's used in video goggles for gaming. Unlike the regular video goggles, though, the images would be beamed from the LCD using laser pulses of near-infrared light to a photovoltaic silicon chip - one-third as thin as a strand of hair - implanted beneath the retina.

Electric currents from the photodiodes on the chip would then trigger signals in the retina, which then flow to the brain, enabling a patient to regain vision.

A study, to be published online May 13 in Nature Photonics, discusses how scientists tested the photovoltaic stimulation using the prosthetic device's diode arrays in rat retinas in vitro and how they elicited electric responses, which are widely accepted indicators of visual activity, from retinal cells . The scientists are now testing the system in live rats, taking both physiological and behavioral measurements, and are hoping to find a sponsor to support tests in humans.

"It works like the solar panels on your roof, converting light into electric current," said Daniel Palanker, PhD, associate professor of ophthalmology and one of the paper's senior authors. "But instead of the current flowing to your refrigerator, it flows into your retina." Palanker is also a member of the Hansen Experimental Physics Laboratory at Stanford and of the interdisciplinary Stanford research program, Bio-X. The study's other senior author is Alexander Sher, PhD, of the Santa Cruz Institute of Particle Physics at UC Santa Cruz; its co-first authors are Keith Mathieson, PhD, a visiting scholar in Palanker's lab, and James Loudin, PhD, a postdoctoral scholar. Palanker and Loudin jointly conceived and designed the prosthesis system and the photovoltaic arrays.

There are several other retinal prostheses being developed, and at least two of them are in clinical trials. A device made by the Los Angeles-based company Second Sight was approved in April for use in Europe, and another prosthesis-maker, a German company called Retina Implant AG, announced earlier this month results from its clinical testing in Europe.

Unlike these other devices - which require coils, cables or antennas inside the eye to deliver power and information to the retinal implant - the Stanford device uses near-infrared light to transmit images, thereby avoiding any need for wires and cables, and making the device thin and easily implantable.

"The current implants are very bulky, and the surgery to place the intraocular wiring for receiving, processing and power is difficult," Palanker said. The device developed by his team, he noted, has virtually all of the hardware incorporated externally into the goggles. "The surgeon needs only to create a small pocket beneath the retina and then slip the photovoltaic cells inside it." What's more, one can tile these photovoltaic cells in larger numbers inside the eye to provide a wider field of view than the other systems can offer, he added.

Stanford University holds patents on two technologies used in the system, and Palanker and colleagues would receive royalties from the licensing of these patents.

The proposed prosthesis is intended to help people suffering from retinal degenerative diseases, such as age-related macular degeneration and retinitis pigmentosa. The former is the foremost cause of vision loss in North America, and the latter causes an estimated 1.5 million people worldwide to lose sight, according to the nonprofit group Foundation Fighting Blindness. In these diseases, the retina's photoreceptor cells slowly degenerate, ultimately leading to blindness. But the inner retinal neurons that normally transmit signals from the photoreceptors to the brain are largely unscathed. Retinal prostheses are based on the idea that there are other ways to stimulate those neurons.

The Stanford device uses near-infrared light, which has longer wavelength than normal visible light. It's necessary to use such an approach because people blinded by retinal degenerative diseases still have photoreceptor cells, which continue to be sensitive to visible light. "To make this work, we have to deliver a lot more light than normal vision would require," said Palanker. "And if we used visible light, it would be painfully bright." Near-infrared light isn't visible to the naked eye, though it is "visible" to the diodes that are implanted as part of this prosthetic system, he said.

Palanker explained what he's done by comparing the eye to camera, in which the retina is the film or the digital chip, and each photoreceptor is a pixel. "In our model we replace those photoreceptors with photosensitive diodes," he said. "Every pixel is like a little solar cell; you send light, then you get current and that current stimulates neurons in the inner nuclear layer of the retina." That, in turn, should have a cascade effect, activating the ganglion cells on the outer layer of the retina, which send the visual information to the brain that allows us to see.

For this study, Palanker and his team fabricated a chip about the size of a pencil point that contains hundreds of these light-sensitive diodes. To test how these chips responded, the researchers used retinas from both normal rats and blind rats that serve as models of retinal degenerative disease. The scientists placed an array of photodiodes beneath the retinas and placed a multi-electrode array above the layer of ganglion cells to gauge

their activity. The scientists then sent pulses of light, both visible and near-infrared, to produce electric current in the photodiodes and measured the response in the outer layer of the retinas.

In the normal rats, the ganglions were stimulated, as expected, by the normal visible light, but they also presented a similar response to the near-infrared light: That's confirmation that the diodes were triggering neural activity.

In the degenerative rat retinas, the normal light elicited little response, but the near-infrared light prompted strong spikes in activity roughly similar to what occurred in the normal rat retinas. "They didn't respond to normal light, but they did to infrared," said Palanker. "This way the sight is restored with our system." He noted that the degenerated rat retinas required greater amounts of near-infrared light to achieve the same level of activity as the normal rat retinas.

While there was concern that exposure to such doses of near-infrared light could cause the tissue to heat up, the study found that the irradiation was still one-hundredth of the established ocular safety limit.

Since completing the study, Palanker and his colleagues have implanted the photodiodes in rats' eyes and been observing and measuring their effect for the last six months. He said preliminary data indicates that the visual signals are reaching the brain in normal and in blind rats, though the study is still under way.

While this and other devices could help people to regain some sight, the current technologies do not allow people to see color, and the resulting vision is far from normal, Palanker said.

Other members of Palanker's lab involved in the research are graduate students Georges Goetz, David Boinagrov and Lele Wang; senior research associate Philip Huie; research associates Ludwig Galambos and Susanne Pangratz-Fuehrer, PhD; and postdoctoral scholars Yossi Mandel, MD, PhD, and Daniel Lavinsky, MD, PhD. In addition, Theodore Kamins, PhD, a consulting professor in electrical engineering, and James Harris, PhD, professor of electrical engineering, are co-authors. Funding was provided by the National Institutes of Health, the Air Force Office of Scientific Research and Stanford's Bio-X program. Information about Stanford's Department of Ophthalmology, which also supported the research, is available at http://ophthalmology.stanford.edu/.

http://nyti.ms/MbA52Y

So Eager for Grandchildren, They're Paying the Egg-Freezing Clinic

At the Colorado Center for Reproductive Medicine, the founder and medical director, has started to notice something different: more of the women are arriving with company.

By ELISSA GOOTMAN

At the Colorado Center for Reproductive Medicine, a popular destination for women hoping to preserve their fertility by freezing their eggs, Dr. William Schoolcraft, the founder and medical director, has started to notice something different: more of the women are arriving with company. "I see these patients come in, and they're with two elderly people, and I'm like, 'What the hey?' " Dr. Schoolcraft said.

The gray-haired entourages, it turns out, are the parents, tagging along to lend support - emotional and often financial - as their daughters turn to the fledgling field of egg freezing to improve their chances of having children later on, when they are ready to start a family.

The technology to freeze a woman's delicate eggs to be used later, when the eggs being released by her ovaries may no longer be viable, has improved sharply over the past decade. There currently is no single source of data on the number of women who are choosing to freeze their eggs, but doctors in the United States say the practice is slowly growing.

The procedure remains expensive, generally costing between $8,000 and $18,000. And because it offers no guarantees and is still considered experimental by the American Society for Reproductive Medicine, a professional association, it can seem to some like an extravagant gamble.

But it is a gamble that many would-be grandparents are willing to take with their daughters, even if it means navigating a potentially uncomfortable conversation.

"By the time Allison was 35, I felt the clock was tick-tick-ticking," said Candace Kramer, 61, whose daughter took her up on the suggestion to freeze her eggs - and her offer to pay half the bill. "I viewed it as opening up an opportunity for her."

Such arrangements are not unusual, said Dr. Daniel Shapiro, the medical director of Reproductive Biology Associates of Atlanta. He estimated that at least three quarters of his center's egg-freezing patients - more than 100 over the past two years - have parents who paid part or all of the bill.

"I was surprised at first about the parental involvement, but now I expect it to be the case," said Dr. Shapiro, adding that many patients tell him, "My parents want me to have this as a gift."

His center, along with an offshoot called My Egg Bank North America, are trying to make it easier, and less uncomfortable, for family members to pay for the procedure, marketing the "Gift of Hope": a gift certificate and a silver charm bracelet for the recipients.

Rachel Lehmann-Haupt, author of "In Her Own Sweet Time: Unexpected Adventures in Finding Love, Commitment and Motherhood," described conversations about fertility between women and their parents as "the postmodern, adult birds-and-the-bees talk."

She added, "There is a very fine line between concern and pressure."

Gloria Hayes, who lives in Darien, Conn., bit her tongue for months after hearing about egg freezing, hoping that her daughter Jennifer, a restaurateur in Telluride, Colo., would broach the topic herself.

"I just didn't feel right approaching her about it, because it's almost a criticism in a way - 'You're getting old,' " Mrs. Hayes said. When Jennifer finally floated the idea, "I was thrilled," Mrs. Hayes said. "I thought this could just take a lot of the stress off her."

Mrs. Hayes and her husband offered to pay for the procedure, but Jennifer Hayes was initially reluctant to accept the money.

"My mom said to me, 'Do you think we'd rather have this money sitting in an account or have a potential grandchild someday?' " she recalled. "When she positioned it that way, it somehow just changed the way I felt."

"It's a family decision," said Ms. Hayes, 36, who now blogs about her experience at RetrieveFreezeRelax.com. "Because you're talking about your future family. Grandchildren are really important to parents. Everybody wants to experience being a grandparent."

Susan Lorman raised the idea of egg freezing when her daughter Stephanie, a sales representative in Los Angeles, was over for dinner shortly before her 35th birthday. Stephanie had just broken up with the latest in a string of boyfriends and was in tears, distraught over what-if situations that involved losing her shot at motherhood.

"I thought no, no, no, I'm going to give it one more year," Stephanie said. But on the eve of her 36th birthday, Stephanie took her mother up on her suggestion and called a fertility doctor, David Tourgeman, whom she had met at the gym.

"It was a gift of love," Mrs. Lorman said. "I'd had my kids at 22, and here she is, a healthy, beautiful young woman who felt her years were passing her by."

When Brigitte Adams, a San Francisco marketing consultant, brought up the idea of freezing her eggs to her parents, her father quickly approved. So quickly that, for a moment, Ms. Adams felt stung.

"It was a little degree of shock," she said. "This is actually real if they're pushing me towards this," she recalled thinking at the time.

Ms. Adams, who is 39, said she felt "this incredible calmness" after freezing her eggs. "No longer was I under such pressure that the next guy I dated would be daddy material," she said.

Her parents not only paid half the cost of the procedure but also invested in Ms. Adams's new venture: Eggsurance.com, a Web site about egg freezing.

As the technology has evolved, more fertility clinics across the country have begun offering egg freezing to two groups: women preparing to undergo cancer treatment, which can affect fertility, and those seeking to expand their window for childbearing.

The Society for Assisted Reproductive Technology, a professional group, has begun collecting data on how many women freeze their eggs, but it is not yet available.

The number of babies born from frozen eggs is not tracked. Some experts put the figure at more than 2,000 worldwide, many from donor eggs.

The American Society for Reproductive Medicine's experimental label is under review; some fertility professionals say that removing the label could prompt a surge of interest.

Still, there are doctors who caution that egg freezing can provide a false sense of security: What if a patient pays to freeze her eggs at 34, only to discover that she is unable to get pregnant with them in her 40s?

Such risks, though, can seem less weighty to patients when their parents share the cost.

Amy West, 37, a psychologist in Chicago, said that she could have afforded the $7,600 bill to freeze her eggs, but that with her parents paying $5,000, "it somehow didn't feel like as scary an investment."

In November, Ms. West's mother, father and brother flew in from Washington for the egg retrieval, which followed days of hormone injections.

Even Ms. West's mother, an international environmental and human rights lawyer, whom Ms. West described as "very career oriented" and "not the type to nag," could not resist a joke after hearing how many of her daughter's eggs had been successfully frozen.

"I have 26 grandbabies!" she exclaimed.