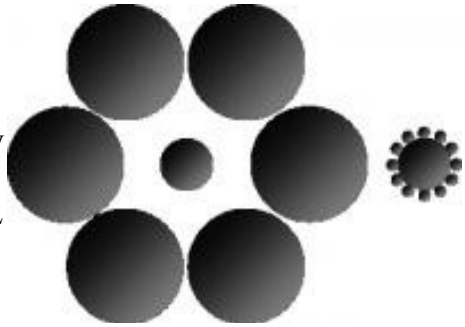
http://www.eurekalert.org/pub_releases/2010-12/wt-stw120210.php

Seeing the world differently

How the brain's architecture makes our view of the world unique

Wellcome Trust scientists have shown for the first time that exactly how we see our environment depends on the size of the visual part of our brain.

We are all familiar with the idea that our thoughts and emotions differ from one person to another, but most people assume that how we perceive the visual world is usually very similar from person to person. However, the primary visual cortex – the area at the back of the brain responsible for processing what we see in the world around us – is known to differ in size by up to three times from one individual to the next.



Now, researchers at the Wellcome Trust Centre for Neuroimaging at UCL (University College London) have shown for the first time that the size of this area affects how we perceive our environment. Their study is published online today in the journal Nature Neuroscience.

The Ebbinghaus illusion. Most people will see the first circle as smaller than the second one Researchers found a strong link between the surface area of the primary visual cortex and the extent to which volunteers perceived the size illusion - the smaller the area, the more pronounced the visual illusion. **Dr Samuel Schwarzkopf, UCL**

Dr D Samuel Schwarzkopf, Chen Song and Professor Geraint Rees showed a series of optical illusions to thirty healthy volunteers. These included the Ebbinghaus illusion, a well-known illusion in which two circles of the same size are each surrounded by circular 'petals'; one of the circles is surrounded by larger petals, the other by smaller petals. Most people will see the first circle as smaller than the second one

In a second optical illusion, the Ponzo illusion, the volunteers were shown two identically sized circles superimposed onto the image of a tunnel. In this illusion, the circle placed further back in the tunnel appears larger than that placed near the front.

By adapting these illusions, the researchers were able to show that individual volunteers saw the illusions differently. For example, some people saw a big (although illusory) difference in size between the two circles, but others barely saw any difference in apparent size.

Using functional magnetic resonance imaging (fMRI), the rese
archers were also able to measure the surface area of the primary visual cortex in each volunteer. They found a great deal of variability in the size of this area. Surprisingly, there was a strong link between its size and the extent to which volunteers perceived the size illusion – the smaller the area, the more pronounced the visual illusion.

"Our work is the first to show that the size of part of a person's brain can predict how they perceive their visual environment," explains Dr Schwarzkopf. "Optical illusions mystify and inspire our imagination, but in truth they show us that how we see the world is not necessarily physically accurate, but rather depends a lot on our brains. Illusions such as the ones we used influence how big something looks; that is, they can trick us into believing that two identical objects have different sizes.

"We have shown that precisely how big something appears to you depends on the size of a brain area that is necessary for vision. How much your brain tricks you depends on how much 'real estate' your brain has put aside for visual processing."

http://www.eurekalert.org/pub_releases/2010-12/aeco-soh120110.php

Study of how genes activate yields surprising discovery

Einstein College of Medicine research shows certain genes are 'clueless'

BRONX, NY – Scientists at Albert Einstein College of Medicine of Yeshiva University have made an unexpected finding about the method by which certain genes are activated. Contrary to what researchers have traditionally assumed, genes that work with other genes to build protein structures do not act in a coordinated way but instead are turned on randomly. The surprising discovery, described in the December 5 online edition of Nature Structural and Molecular Biology, may fundamentally change the way scientists think about the way cellular processes are synchronized.

All cells contain protein complexes that perform essential functions, such as producing energy and helping cells divide. Assembling these multi-protein structures requires many different genes, each of which codes for one of the proteins that, collectively, form what's known as the protein complex. Ribosomes, for example, are the vitally important structures on which proteins are synthesized. (The ribosomes of humans and most other organisms are composed of ribonucleic acid (RNA) and 80 different proteins.) Scientists have long assumed that genes involved in making such complex structures are activated in a highly-coordinated way.

"What we found was rather astonishing," said Robert Singer, Ph.D., professor and co-chair of anatomy and structural biology, professor of cell biology and of neuroscience at Einstein and senior author of the study. "The expression of the genes that make the protein subunits of ribosomes and other multi-protein complexes is not at all coordinated or co-regulated. In fact, such genes are so out of touch with each other that we dubbed them "clueless" genes."

Gene expression involves transcribing a gene's deoxyribonucleic acid (DNA) message into molecules of messenger RNA, which migrate from the nucleus of a cell into the surrounding cytoplasm to serve as blueprints for protein construction. To assess the coordinated expression of particular genes, Dr. Singer and his colleagues measured the abundance of messenger RNA molecules transcribed by those genes in individual cells. The messenger RNA molecules made by clusters of clueless genes exhibited no more coordination than the messenger RNA from totally unrelated genes did.

The "clueless" genes coding for ribosomes and other multi-protein structures are referred to as housekeeping genes, since their essential tasks require them to be "on call" 24/7, while other gene clusters remain silent until special circumstances induce them to become active. The researchers found that these induced genes, in contrast to the "clueless" housekeeping genes, act in an expected (well-regulated) way. For example, growing yeast cells in nutrient media containing the sugar galactose triggered the highly-coordinated expression of the three genes required to metabolize galactose.

"Our findings show that for a major class of genes – those housekeeping genes that make ribosomes, proteasomes and other essential structures – cells employ very simple modes of gene expression that require much less coordination than previously thought," said Saumil Gandhi, the lead author of the study. "Those genes become active randomly, with each member of a functionally related gene cluster encoding a protein while having no clue what the other genes in the cluster are doing. Yet the cell somehow manages to deal with this randomness in successfully assembling these multi-protein complexes."

The paper, "Transcription of functionally related constitutive genes is not coordinated," appears in the December 5 online edition of Nature Structural and Molecular Biology.

http://www.eurekalert.org/pub_releases/2010-12/uoc-srn120310.php

Study reveals new possibility of reversing damage caused by MS

Damage caused by multiple sclerosis could be reversed by activating stem cells that can repair injury in the central nervous system, a study has shown.

Researchers from the Universities of Cambridge and Edinburgh have identified a mechanism essential for regenerating insulating layers – known as myelin sheaths – that protect nerve fibres in the brain. In additional studies in rodents, they showed how this mechanism can be exploited to make the brain's own stem cells better able to regenerate new myelin.

In multiple sclerosis, loss of myelin leads to the nerve fibres in the brain becoming damaged. These nerve fibres are important as they send messages to other parts of the body. The scientists believe that this research will help in identifying drugs to encourage myelin repair in multiple sclerosis patients.

Professor Robin Franklin, Director of the MS Society's Cambridge Centre for Myelin Repair at the University of Cambridge, said: "Therapies that repair damage are the missing link in treating multiple sclerosis. In this study we have identified a means by which the brain's own stem cells can be encouraged to undertake this repair, opening up the possibility of a new regenerative medicine for this devastating disease."

The study, funded by the MS Society in the UK and the National Multiple Sclerosis Society in America, is published in Nature Neuroscience.

Professor Charles French-Constant, of the University of Edinburgh's MS Society Centre for Multiple Sclerosis Research, said: "The aim of our research is to slow the progression of multiple sclerosis with the eventual aim of stopping and reversing it. This discovery is very exciting as it could potentially pave the way to find drugs that could help repair damage caused to the important layers that protect nerve cells in the brain."

Multiple sclerosis affects almost 100,000 people in the UK and several million worldwide. It often targets young adults between the ages of 20 and 40.

http://news.discovery.com/tech/new-tech-could-revolutionize-recycling.html#mkcpgn=rssnws1

New Tech Could Revolutionize Recycling

First-of-its-kind technique recovers pulp and plastics that were otherwise unrecyclable.

content provided by Daniel Rook/AFP

Paijit Sangchai drops a small piece of laminated paper into a jar of cloudy liquid which he hopes will transform his start-up into a multimillion dollar company and help revolutionize recycling.

"Now this is the fun part," he says a few minutes later, holding it under the tap to wash away soggy paper pulp and reveal a clear plastic film.

His Thai firm, Flexoresearch, has developed a series of blended enzymes that can recover pulp or fiber from laminated paper such as cigarette packets, stickers or milk cartons that were previously hard or impossible to recycle.

First one enzyme attacks the water resistant chemical coating the surface, then others take over and tackle the paper and adhesive layers. The resulting pulp, he says, can be used to produce new paper products - thus saving trees - or turned into building materials that can be used as an alternative to asbestos, which is potentially hazardous to human health. The technique, believed to be the first of its kind, also produces clean plastic that can be recycled and used to produce new products.

The firm was recently named one of 31 "Technology Pioneers" by the World Economic Forum, which said its products were "poised to reduce the use of asbestos in the developing world, positively impacting people's health." Time Magazine described Flexoresearch as one of "10 start-ups that will change your life". It is a rare honor to be bestowed on an entrepreneur in a country hardly renowned for its technological prowess.

In developing countries such as Thailand, laminated paper is usually thrown away, Paijit says. "Most people burn it illegally and that causes toxic fumes which harm people's health," he tells AFP at his small laboratory in a science park on the northern outskirts of Bangkok. "For people in developing countries who suffer from the fumes and don't know why they are sick ... it can help improve their lives," he adds.

And while developed countries like the United States are able to incinerate laminated paper such as fast food wrappers safely, they do not have any commercially viable way to recycle it either, he says.

"Every country uses laminated paper, in stickers and wrappers of food like McDonald's and Kentucky Fried Chicken. That's all laminated and people throw it away," he says. "I think this a global market."

Since winning the Technology Pioneer award - previous recipients of which include Google and Twitter - Paijit has been flooded with thousands of emails, mostly from venture capitalists interested in investing in his start-up.

But the affable company founder and CEO is not interested in borrowing more money or selling stakes to investors. He is looking for people overseas who want to license the technology, which is already attracting interest in countries including Malaysia, Japan, China, South Korea and India.

"I want to work with people around the world to heal the environment," says Paijit.

It is a far cry from the days he spent experimenting with enzymes produced from mushrooms in a home laboratory after quitting a more than decade-long, well-paid career with a leading Thai industrial giant four years ago. He invested his savings, then borrowed heavily from the bank, putting up his house as collateral to keep the project going and build a paper mill in eastern Bangkok.

At one point the firm was in debt to the tune of about 1.5 million dollars, but it has since repaid all the money and now employs 17 people.

And Paijit is already eyeing ways to turn other problems into profits, including a technique to turn used liquid coolant drained from refrigeration systems into oil that can be used in the construction industry.

"I make a profit from a problem. I convert waste into wealth," he says.

http://www.eurekalert.org/pub_releases/2010-12/lsoh-lar120610.php

Low-dose aspirin reduces death rates from range of cancers by between 20 and 30 percent

Benefit unrelated to dose, gender or smoking - but increases with age

The London School of Hygiene & Tropical Medicine (LSHTM) has contributed to a study showing that a low dose of aspirin reduces the occurrence of several common cancers. The study is published in today's Lancet.

The work was started and carried out by Professor Peter Rothwell in Oxford, and is based on an overview of several randomised trials of aspirin. These have been primarily concerned with reducing heart attacks, but have also gathered information on deaths from cancer.

The trial contributing most information to the overview has been the Thrombosis Prevention Trial (funded jointly by the Medical Research Council and the British Heart Foundation) which was carried out by Tom Meade when he was with the Medical Research Council. Professor Meade is now Emeritus Professor of Epidemiology in LSHTM's Department of Non-Communicable Disease Epidemiology.

As well as confirming that low dose aspirin reduces large bowel cancer cases reported in another recent study also led by Professor Rothwell and to which Professor Meade contributed, it also reduces total deaths due to cancer because it affects several common individual cancers, such as those of the oesophagus (gullet), lung, stomach, pancreas and possibly the brain. Reductions in deaths are around 20-30%.

Benefit is unrelated to aspirin dose from 75mg upwards, gender or smoking habit but increases with age. Aspirin may need to be taken for at least five years before it confers benefit, probably longer for some cancers, but benefit is generally greater the longer aspirin has been taken.

Hitherto, advice about aspirin has been mainly concerned with reducing heart attacks and strokes in those who have already had them. Caution should be exercised by those who are so far free of these conditions because, unless a person's risk of them is very high, the benefit may be outweighed by the risk of serious bleeding.

Professor Meade says: 'These are very exciting and potentially important findings. They are likely to alter clinical and public health advice about low dose aspirin because the balance between benefit and bleeding has probably been altered towards using it', although Professor Meade adds that this does not mean everyone should automatically take aspirin. Health professionals and others will now have to consider the practical implications.

http://www.eurekalert.org/pub_releases/2010-12/jaaj-cwa120210.php

Children who attend group child care centers get more infections then, but fewer during school years

Children who attend large group child care facilities before age 2½ appear to develop more respiratory and ear infections at that age, but fewer such illnesses during elementary school years, according to a report in the December issue of Archives of Pediatrics & Adolescent Medicine, one of the JAMA/Archives journals.

"Preschool children in group child care experience more frequent infections than do children cared for primarily at home, and the risk seems greater when children attend larger group child care [facilities]," the authors write as background information in the article. "These findings have created concerns that group child care may compromise the health of young children and their community. However, few studies have examined the impact of group child care on infections beyond the preschool years."

Sylvana M. Côté, Ph.D., of Ste-Justine Hospital and the University of Montreal, Quebec, Canada, and colleagues studied 1,238 families with newborns in 1998. Mothers reported whether their children went to a large child care facility (defined as a center where professional educators care for up to 10 groups of eight to 12 children), a small child care facility (home-based centers where a caretaker watches three to eight children) or were cared for at home. For eight years, the researchers regularly obtained information about how often the children had respiratory tract infections, ear infections or gastrointestinal infections during early preschool (before age 2 ½ years), late preschool (ages 3 ½ to 4 ½) and early elementary school (ages 5 to 8).

Compared with children cared for at home until elementary school, those who began attending large group child care before age 2 ½ had higher rates of respiratory infections and ear infections during early preschool, the same risk of infection during the late preschool period and lower risks of contracting respiratory tract or ear infections during early elementary school. However, those who started in small group child care in early preschool and never went into large care settings did not have any differences in infection risk. Moreover, those who were first cared for at home but then started at any size child care facility during late preschool had a higher risk of ear infections at that time, but no other differences in infection risk.

Group child care was not associated with gastrointestinal infections at any period in the children's development.

The findings suggest that developmental processes may underlie the association between early exposure to large groups of children and reduced infection risk, the authors note. "One possible mechanism that has received empirical support in the context of long-term protection against asthma involves an increased repeated stimulation of the immature immune system by early and mild infections," they write. "Future studies are necessary to investigate this and other mechanisms that may account for the results."

"This study provides reassuring evidence for parents that their choices regarding child care (group size and age at enrollment) should not have a major effect on the health of their children from a long-term (eight-year) perspective, at least regarding respiratory tract infections with fever, gastrointestinal tract infections and ear infections," the authors conclude. "Children who initiate large-group child care early (i.e., before age 2 ½ years) may even gain protection against infections during the elementary school years, when absenteeism carries more important consequences for school adaptation and performance. Physicians may reassure parents whose children initiate large group child care early that their child's experiencing infections is temporary and is likely to provide them with greater immunity during the elementary school years."

(Arch Pediatr Adolesc Med. 2010;164[12]:1132-1137. Available pre-embargo to the media at www.jamamedia.org.)

http://www.eurekalert.org/pub_releases/2010-12/w-har120610.php

Heart-attack risk increases rapidly after rheumatoid arthritis is diagnosed

Large-scale study reports 60 percent increase in risk just a year after diagnosis

The risk of having a heart attack is 60 per cent higher just a year after a patient has been diagnosed with rheumatoid arthritis, according to research published in the December issue of the Journal of Internal Medicine.

Swedish researchers followed 7,469 patients diagnosed with rheumatoid arthritis (RA) between 1995 and 2006, together with 37,024 matched controls without RA to determine the risk of ischaemic heart disease, with

particular reference to myocardial infarction (heart attack). The maximum follow-up was 12 years and the median was just over four years.

"Our findings emphasise the importance of monitoring a patient's heart risk from the moment they are diagnosed with rheumatoid arthritis, as the risk rises rapidly in the first few years" says lead author Marie Holmqvist from the Karolinska Institutet.

Key findings of the study included:

* Average age at diagnosis was just under 57 years and 71 per cent of the patients with RA were women. The median time from the appearance of RA symptoms to diagnosis was 6.2 months.

* 67 per cent of the patients had a positive rheumatoid factor (RF), an immunological marker found in a number of acute and chronic conditions. The difference in increased heart attack risk between the RF positive and negative subgroups was not statistically significant – 70 per cent higher in RF positive patients and 60 per cent higher in RF negative patients.

* Having RA increased the risk of any ischaemic heart disease by 50 per cent one to four years after diagnosis, staying at that level in years five to 12. The risk increased during the first year after diagnosis, but did not reach statistical significance for 12 months.

* The risk of an acute heart attack rose by 60 per cent one to four years after diagnosis, remaining at the same level in years five to 12. Again, the level increased in year one, but was not statistically significant for the first 12 months.

"Our study confirms the increased risk of heart disease and heart attacks that patients with RA face" says Marie Holmqvist. "However it also adds three important observations to previous research."

These are:

* The increased heart attack risk was apparent very soon after RA diagnosis, despite the fact that the median duration of symptoms before diagnosis was just over six months.

* Although RA has been caught earlier and treated more aggressively in the last decade, increased heart attack risks were still seen in patients diagnosed in the last five to ten years.

* Both rheumatoid factor positive and rheumatoid factor negative were associated with an increased heart attack risk.

"Our research underlines the importance of clinicians monitoring patients diagnosed with rheumatoid arthritis for an increased risk of heart problems, in particular heart attacks" concludes Marie Holmqvist. "It is also very clear that more research is needed to determine the mechanisms that link these two health conditions."

Notes to editors *Rapid increase in myocardial infarction following diagnosis of rheumatoid arthritis amongst patients diagnosed between 1995 and 2006. Journal of Internal Medicine. 268, pp578-585. (December 2010). DOI: 10.1111/j.1365-2796.2010.02260.x*

The Journal of Internal Medicine publishes original clinical work within the broad field of general and internal medicine and its sub-specialties. It features original articles, reviews, and case reports. JIM also supports and organises scientific meetings in the form of symposia within the scope of the journal. http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1365-2796

http://www.eurekalert.org/pub_releases/2010-12/nu-dpp120610.php

Drug prevents post-traumatic stress syndrome

Researchers calm an overly stimulating chemical within 5 hours of trauma

CHICAGO --- Post-traumatic stress syndrome – when a severely stressful event triggers exaggerated and chronic fear – affects nearly 8 million people in the United States and is hard to treat. In a preclinical study, Northwestern Medicine scientists have for the first time identified the molecular cause of the debilitating condition and prevented it from occurring by injecting calming drugs into the brain within five hours of a traumatic event.

Northwestern researchers discovered the brain becomes overly stimulated after a traumatic event causes an ongoing, frenzied interaction between two brain proteins long after they should have disengaged.

"It's like they keep dancing even after the music stops," explained principal investigator Jelena Radulovic, associate professor of psychiatry and behavioral sciences and Dunbar Scholar at Northwestern University Feinberg School of Medicine. When newly developed research drugs MPEP and MTEP were injected into the hippocampus, the calming drugs ended "the dance."

"We were able to stop the development of exaggerated fear with a simple, single drug treatment and found the window of time we have to intervene," Radulovic said. "Five hours is a huge window to prevent this serious disorder." Past studies have tried to treat the extreme fear responses, after they have already developed, she noted. The study, conducted with mice, was published Dec. 1 in the journal Biological Psychiatry.

An exaggerated fear disorder can be triggered by combat, an earthquake, a tsunami, rape or any traumatic psychological or physical event.

"People with this syndrome feel danger in everything that surrounds them," Radulovic said. "They are permanently alert and aroused because they expect something bad to happen. They have insomnia; their social and family bonds are severed or strained. They avoid many situations because they are afraid something bad will happen. Even the smallest cues that resemble the traumatic event will trigger a full-blown panic attack."

In a panic attack, a person's heart rate shoots up, they may gasp for breath, sweat profusely and have a feeling of impending death.

Many people bounce back to normal functioning after stressful or dangerous situations have passed. Others may develop an acute stress disorder that goes away after a short period of time. But some go on to develop post-traumatic stress syndrome, which can appear after a time lag.

The stage is set for post-traumatic stress disorder after a stressful event causes a natural flood of glutamate, a neurotransmitter that excites the neurons. The excess glutamate dissipates after 30 minutes, but the neurons remain frenzied. The reason is the glutamate interacts with a second protein (Homer1a), which continues to stimulate the glutamate receptor, even when glutamate is gone.

For the study, Northwestern scientists first subjected mice to a one-hour immobilization, which is distressing to them but not painful. Next, the mice explored the inside of a box and, after they perceived it as safe, received a brief electric shock. Usually after a brief shock in the box, the animals develop normal fear conditioning. If they are returned to the box, they will freeze in fear about 50 percent of the time. However, after the second stressful experience, these mice froze 80 to 90 percent of the time.

The animals' exaggerated chronic fear response continued for at least one month and resembles post-traumatic stress disorder in humans, Radulovic said.

For the second part of the study, Natalie Tronson, a postdoctoral fellow in Radulovic's Dunbar Laboratory for Research on Memory and Fear, and Radulovic repeated the two stressful experiences with the mice but then injected them with MPEP and MTEP five hours after the immobilization. This time the mice did not develop the exaggerated fear response and froze for only 50 percent of the time.

"The mice's fear responses were completely normal," Radulovic said. "Their memories of the stressful event didn't trigger the extreme responses anymore. This means we could have a prevention approach for humans exposed to acute, severe stressful events. " *The research was supported by the National Institute of Mental Health.*

http://www.eurekalert.org/pub_releases/2010-12/ghri-msd120610.php

Mammogram sensitivity depends on menstrual cycle

Group Health study finds first week is best for some women

SEATTLE - Try to schedule your screening mammogram during the first week of your menstrual cycle. It might make breast cancer screening more accurate for pre-menopausal women who choose to have regular mammograms. This recommendation comes from an article published online December 3 in Radiology by Diana Miglioretti, PhD, a senior investigator at Group Health Research Institute.

Dr. Miglioretti and her co-authors are working on an issue at the heart of recent controversies about breast cancer screening mammograms. In November 2009, new recommendations - including that women should discuss with their doctors whether to begin having regular screening mammograms at age 40 or wait till age 50 - were issued by the U.S. Preventive Services Task Force, an independent panel of health care providers who generate medical guidelines based on clinical research.

Some facts related to the new recommendations prompted the study by Dr. Miglioretti and colleagues:

* Mammography can detect cancer in women in their 40s.
* But these women are at higher risk than are older women for a false-negative result (missing a cancer that is present) or a false-positive result (recalling a woman for further workup when cancer is not present).
* False positives lead to unnecessary tests, including biopsies.
* Women in their 40s tend to have dense breast tissue, making their mammograms hard to interpret. Dense breast tissue shows up as white on a mammogram and can obscure abnormal findings, which are also white.
* Breast density varies slightly with menstrual cycle.

Dr. Miglioretti's team asked whether mammography conducted at different times in the menstrual cycle, when breast density may be different, is more sensitive for finding breast cancers or more specific for ruling out cancer. They examined 387,218 screening mammograms from premenopausal women. Of these, 1,283 were linked to an actual case of breast cancer. The data were from the Breast Cancer Surveillance Consortium, a network of research sites nationwide - including Group Health Research Institute, which has collected breast cancer screening data since 1994.

"Premenopausal women having regular screening mammography could benefit from scheduling their exams during the first week of their menstrual cycle," says Miglioretti. She and her collaborators found that in the first week, when breast tissue may be less dense and not engorged, mammography was more sensitive at detecting

cancer. Specificity, which is the ability to reliably recognize the absence of breast cancer, did not change with menstrual cycle.

Miglioretti notes, however, that the increased sensitivity was only for women with a screen in the past two years, who were assumed to be having regular screens, and not for women being screened for the first time. Miglioretti says this result was "surprising," but offers some possible reasons. In general, when first screens find a tumor, it's relatively large. Low breast density is more important for detecting small tumors, so the menstrual cycle influence might not have been seen for first screens. "Larger tumors may be easier to see later in the menstrual cycle, but this needs to be studied," says Miglioretti. In addition, her findings do not apply to diagnostic mammography: mammography performed to work up a symptom such as a breast lump. If a woman finds a breast lump or has another breast concern, she should contact her doctor right away.

Dr. Miglioretti and her co-authors know that women can't always predict their cycle, but say if they can, scheduling during the first week may have an additional advantage. Many women experience breast tenderness in the second half of their cycle, so avoiding this time could reduce mammography discomfort.

Current recommendations are that women aged 50-74 have a routine screening mammogram every other year. Women are encouraged to consult with their health care providers to find a mammography schedule that fits their family history and personal preferences.

Dr. Miglioretti's co-authors were Rod Walker, MS, and Diana S.M. Buist, PhD, MPH, of Group Health Research Institute; Zhuo (Tracy) Zhang, MS, of the University of Washington Department of Biostatistics; Emily White, PhD, of the University of Washington Department of Epidemiology, who is also an affiliate investigator at Group Health Research Institute; Donald L. Weaver, MD, of the University of Vermont College of Medicine; Stephen H. Taplin, MD, MPH, of the Applied Research Program, Division of Cancer Control and Population Sciences, National Cancer Institute, in Bethesda, MD; Patricia A. Carney, PhD, of the Departments of Family Medicine and Public Health and Preventive Medicine, Oregon Health & Science University, in Portland, OR; Robert D. Rosenberg, MD, of the Department of Radiology, University of New Mexico, Health Sciences Center, in Albuquerque; Mark B. Dignan, PhD, MPH, Department of Internal Medicine, University of Kentucky, in Lexington.

Funding was from the National Institutes of Health.

http://www.physorg.com/news/2010-12-extensive-regeneration-nerve-eye-brain.html

Extensive regeneration in nerve connecting eye to brain achieved

Damage to the optic nerve, connecting the eye with the brain, is a major cause of blindness. The most common culprit is glaucoma, estimated to affect more than 4 million Americans. There is currently no way to restore the lost vision, because the optic nerve, like other nerves in the mature central nervous system (CNS), cannot regenerate. Now, scientists at Children's Hospital Boston report achieving the greatest regeneration to date in the mammalian optic nerve.

Research in animal models has revealed many of the factors thwarting nerve regeneration in the mature CNS. The Children's scientists have now discovered that two molecular pathways, which each promote some optic nerve regeneration on their own, can work synergistically. By activating these pathways simultaneously in a mouse model, they attained about 10-fold the regeneration seen with activation of either pathway alone.

"This is really a massive change," says Larry Benowitz, PhD, a member of the Neurobiology and Neurosurgery Departments at Children's and a Professor of Surgery and Ophthalmology at Harvard Medical School. "It brings us closer to potentially restoring function after vision loss caused by optic nerve damage."

The synergistic effect, described November 17th in the Journal of Neuroscience, was achieved by simultaneously targeting the protein oncomodulin, elevating levels of the small signaling molecule cyclic adenosine monophosphate (cAMP) and deleting the gene that encodes the enzyme PTEN. The injured retinal nerve fibers regrew over long distances, with many making it all the way from the eye down the entire length of the optic nerve and across a structure at the base of the brain called the optic chiasm-where nerve fibers from the left and right eyes partially cross. Some rare nerve fibers even reached the thalamus, a deep brain region critical for early stages of visual processing.

Oncomodulin, as discovered in 2006 by Benowitz's laboratory, is a factor secreted by immune cells in the eye in response to inflammation; it activates the intrinsic growth state of nerve cells in the retina. cAMP does not promote optic nerve regeneration by itself, but when elevated can enhance the effects of oncomodulin. PTEN is an enzyme that acts as a critical brake on cell growth; work from the Children's laboratories of Zhigang He, MD, PhD, and Mustafa Sahin, MD, PhD, showed in 2008 that deletion of the PTEN gene promotes a moderate amount of optic nerve regeneration on its own.

In the present work, Benowitz's team, including first author Takuji Kurimoto, MD, PhD, first showed that cAMP enhances regeneration by improving the ability of oncomodulin to bind to its receptors on retinal neurons. The team had some evidence that oncomodulin produced its regenerative effects via a cell growth

pathway known as the PI3K pathway, and they knew that deletion of PTEN activates the same pathway. However, as Benowitz explains, "We didn't know whether the PI3K pathway was already fully activated by oncomodulin, or whether there remained brakes on it".

Their experiments showed that PTEN deletion further activates the regenerative pathway turned on by oncomodulin. "While the PI3K pathway is involved in oncomodulin's actions, it's still only partially activated. So the PTEN deletion then fully activates the PI3K pathway," Benowitz says. "And by removing all the brakes on it, we get this remarkable level of growth."

The main thrust of research on nerve regeneration has been to disable natural "brakes" on nerve growth, but the three-pronged approach tested in this study was able to achieve significant amounts of regeneration without targeting these brakes - instead, it worked by stepping on the gas, activating the intrinsic growth potential of nerve cells, Benowitz says.

Benowitz now hopes to find out whether combining the current strategy with an attack on the extrinsic growth-inhibitory factors could achieve even greater nerve regeneration, so that more nerves from the retina make it all the way to the thalamus. The lab is also investigating whether the increase in optic nerve regeneration results in improved vision in the mice.

Finally, more work remains to be done before the regenerative strategy discovered in this study can be applied to humans. For instance, researchers must find a way to deliver sufficient levels of oncomodulin to the eye over a prolonged period, or induce its production without inflammation. "We need a more clinically appropriate delivery system," says Benowitz.

In addition, assuming nerve fibers from the retina can be made to grow all the way to the thalamus, they will have go to the right places in the thalamus. "In order to have structured vision it's necessary to have topographic representation of visual space onto the brain," Benowitz explains. *Provided by Children's Hospital Boston*

http://news.discovery.com/dinosaurs/pre-dinosaur-predator-found-with-fangs-intact.html

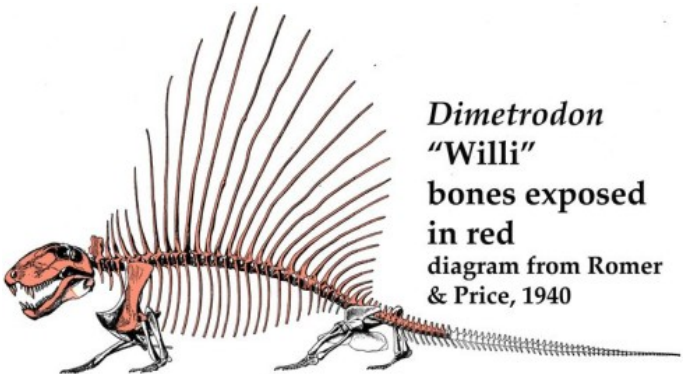
Pre-Dinosaur Predator Found with Fangs Intact

By Jennifer Viegas Mon Dec 6, 2010 05:55 PM ET

Paleontologists from the Houston Museum of Natural Science (HMNS) have just announced that they've unearthed a rare skull - complete with fangs - for a pre-Dinosaur Era predator that lived 287 million years ago.

Nicknamed "Wet Willi," the skull and fossils belong to Dimetrodon giganhomogenes. This reptile, with its iconic sail-shaped back, is often mistakenly identified as a dinosaur, and is even included in packages of toy dinosaurs. Such reptiles, in fact, lived several million years before the first dinos emerged.

Robert Bakker, curator of paleontology at the HMNS, and his team found the new specimen at Craddock Brothers Ranch in Seymour, Texas. "Wet Willi" came to mind as a nickname because the fossils were discovered during the excavation of a drainage trench and because a dino expert named Samuel Williston conducted work in the area 100 years ago. Well-preserved fossils like this of Dimetrodon are rare, according to the researchers.



Dimetro-Willi-RP **(Image: HMNS)**

In life, "Willi" was the dominant predator of his world. He would have been 11 feet long with a four-foot vertical fin running the length of his body. The purpose of the prominent fin that defines this species has been debated since it was first discovered by paleontologist Edward Cope in Texas in 1878.

It was originally suggested that the fin was used for thermoregulation - self-regulation of body temperature - even when outside temperatures may vary drastically. It now, however, seems more likely that this dramatic fin was for show, to intimidate enemies and woo potential mates.

"Wet Willi" will be the star of the Permian section of the HMNS' newly renovated paleontology hall, opening in 2012.

"There is a very strong Texas connection to Dimetrodon, and we are thrilled to be able to display one in Houston, along with the other animals that made up this ancient ecosystem," said Bakker, adding that the specimen is "jaw-droppingly beautiful."

Area ranchers agree. "The only thing prettier is a new born calf," local cattleman Donald Coltharp remarked.

Video, additional images and information about the newly unearthed Dimetrodon are at the HMNS blog "Beyond Bones."

http://www.eurekalert.org/pub_releases/2010-12/uok-rer120210.php

Research exposes racial discrimination against Asian-American men in job market

LAWRENCE - *A new study by a University of Kansas researcher shows that U.S. employers fail to pay Asian-American men as much as they pay similarly qualified white men.*

"The most striking result is that native-born Asian Americans - who were born in the U.S. and speak English perfectly - their income is 8 percent lower than whites after controlling for their college majors, their places of residence and their level of education," said ChangHwan Kim, assistant professor of sociology at KU, who led the study. Full results of the research appear in the December issue of the American Sociological Review in which Kim and Arthur Sakamoto of the University of Texas-Austin authored the article "Have Asian American Men Achieved Labor Market Parity with White Men?"

According to Kim, the findings show that the United States falls short of the goal of a colorblind society.

"As an individual, you can reach as high as president," said the KU researcher. "But as an ethnic group, no group has reached full parity with whites. That's the current status of racial equality in the United States."

Kim and Sakamoto combed data from the 2003 National Survey of College Graduates to investigate earnings - numbers that have not been used previously in research on Asian Americans.

Among their other notable findings:

* First-generation Asian-American men, who were born and completed their education overseas, earn 29 percent less than white men earn in the United States.

* 1.25-generation Asian-American men, who earned their highest degree at a U.S. institution but were born and previously educated in a foreign country, had incomes 14 percent lower than those of white men.

* The only group to have achieved earnings parity with white men is 1.5-generation Asian-American men. Though foreign-born, these men came to the United States as children, so they speak perfect English and have U.S. educations.

Kim said that 1.5-generation Asian-American men could benefit economically from their parents' immigrant work ethic. "They see their parents struggle, and they understand that their achievement in the United States is actually their parents achievement, it's not their own goal, it's the goal for their whole family," he said. "They actually have a burden of success."

Despite the disparity in income levels, Asian-American men fare better than they did before the Civil Rights era in the United States. Advancement toward an end to racial discrimination continues, according to Kim.

"The 8 percent difference is large, but it is small compared to previous Asian-American generations," Kim said. "Previous generations had income levels much lower, so in this sense we've made progress."

http://www.eurekalert.org/pub_releases/2010-12/afps-pij120710.php

People in jobs traditionally held by the other sex are judged more harshly for mistakes

In these modern times, people can have jobs that weren't traditionally associated with their genders. Men are nurses; women are CEOs. A new study examines perceptions of people in high-powered jobs and finds that they're likely to be judged more harshly for mistakes if they're in a job that's not normally associated with their gender.

"The reason I got interested is, there was so much talk about race and gender barriers being broken," says Victoria Brescoll, a psychological scientist at Yale University and first author of the study. In the 2008 presidential election, a woman came close to getting a nomination, and an African-American man ended up president of the United States - a job formerly reserved for white men.

But just getting a job with high status isn't enough, Brescoll says; you have to keep it. She suspected that people who have a job not normally associated with their gender would be under closer scrutiny and more likely to get in trouble for mistakes. "Any mistakes that they make, even very minor ones, could be magnified and seen as even greater mistakes," she says.

Brescoll and her colleagues, Erica Dawson and Eric Luis Uhlmann, came up with a list of high-status jobs that are normally held by one gender or the other. This was easy for men, but actually quite difficult for women; the one they came up with was the president of a woman's college. For this study, they compared that to a police chief, a traditionally male role. They pre-tested the jobs to make sure people perceived them as having similar status and also being associated with one gender or the other.

About 200 volunteers read a scenario in which either a police chief or a women's college president made a mistake, sending not enough police officers (or campus security officers) to respond to a protest. The gender of the police chief or college president varied; different people read different texts. Then they were asked how they judged the person who made the mistake.

People who were the non-stereotypical gender were judged more harshly; the volunteers saw them as less competent and deserving of less status. The same was true in other tests with a female CEO of an aerospace

engineering firm and a chief judge. The study is published in Psychological Science, a journal of the Association for Psychological Science.

"There is an effect called the glass cliff," Brescoll says. Like the glass ceiling that keeps women from rising higher, the glass cliff is what counter-stereotypical individuals (such as female police chiefs) are in danger of falling from. "You don't really know, when you're a woman in a high status leadership role, how long you're going to hang onto it," she says. "You might just fall off at any point. Our study points to one way that this may happen for women in high-powered male roles."

The APS journal Psychological Science is the highest ranked empirical journal in psychology. For a copy of the article "Hard Won and Easily Lost: The Fragile Status of Leaders in Gender-Stereotype-Incongruent Occupations" and access to other Psychological Science research findings, please contact Keri Chiodo at 202-293-9300 or kchiodo@psychologicalscience.org.

http://www.eurekalert.org/pub_releases/2010-12/uorm-sca120710.php

Stem cell advance a step forward for treatment of brain diseases

Scientists have created a way to isolate neural stem cells – cells that give rise to all the cell types of the brain – from human brain tissue with unprecedented precision, an important step toward developing new treatments for conditions of the nervous system, like Parkinson's and Huntington's diseases and spinal cord injury.

The work by a team of neuroscientists at the University of Rochester Medical Center was published in the Nov. 3 issue of the Journal of Neuroscience. Neurologist Steven Goldman, M.D., Ph.D., chair of the Department of Neurology, led the team.

The latest paper marks a six-year effort by Goldman's team to develop a better way to isolate pure preparations of neural stem cells directly from the human brain. These stem cells can renew themselves and have the potential to become a number of brain cell types – for instance, oligodendrocytes that might help people with multiple sclerosis, or neurons to help people with Parkinson's disease. But after the first few months of human embryonic development, they become rare in the brain, and it's challenging for scientists to find, isolate and manipulate them. Yet those challenges must be met if stem cells are to live up to their promise as treatments for a host of human diseases of the nervous system.

So far, most efforts aimed at isolating human fetal stem cells have entailed cultivating brain tissue in tissue culture in the laboratory for months, then separating out the stem cells for study. In addition, today's techniques don't separate out just stem cells; typically, similar cells known as progenitor cells, which have already committed to becoming a certain type of cell, are also captured. The difference is crucial for scientists who often prefer to capture only uncommitted neural stem cells, whether to treat brain diseases requiring the replacement of multiple cell types or to better understand their function.

The Goldman lab's new technique snags only neural stem cells and does so directly from brain tissue. The technology saves months of time and labor in the laboratory and also gives scientists a clearer look than ever before at exactly how stem cells operate in the brain.

In its studies, Goldman's team found some surprises. As expected, certain classes of genes encoding for proteins active in mouse neural stem cells – such as members of the Notch and WNT families – were highly active. But when the scientists looked more closely, they found that the freshly isolated neural stem cells expressed some genes from these families that were previously virtually unknown in humans, and which had never before been implicated in human brain function. At the same time, some of the genes that are important and active in mouse neural stem cells proved not to be so in the human cells.

"While research in mice and other animals serves as a guide, ultimately you have to study human tissue and humans to really understand disease in people," said Goldman, who is also co-director of Rochester's Center for Translational Neuromedicine.

"While the general signaling pathways active in mice and people are very similar, the individual genes are quite different. This is not something we would have predicted. It's a good demonstration that you can't use mouse studies to fully dictate what kinds of therapeutics should be used in people."

The ability to gather human cells more efficiently should aid potential treatments built around transplanting stem cells. In the last few years a couple studies using human neural stem cells in the nervous system have begun in children with incurable brain diseases known as pediatric leukodystrophies. But the field is in its infancy, and Goldman believes that the cell types currently being used will soon be replaced by more effective types of transplantable stem and progenitor cells.

The new technology is built around a piece of DNA that codes for a protein known as Sox2, which has long been recognized as a key stem cell gene. Since the gene is active only in stem cells, finding a way to see and isolate cells with an active Sox2 gene is the key.

To track it down, the team identified the DNA sequence, known as an enhancer, that determines whether Sox2 is active in neural stem cells. The scientists took that piece of DNA, coupled it to a gene that makes cells emit light of a particular wavelength, and then packaged the resulting synthetic DNA into a virus. They used the virus to deliver the synthetic DNA to neural stem cells in the brain tissue. The technique compelled neural stem cells – and only the stem cells – to emit light of a certain color, which in turn allowed a laser-based system to tag and capture just those cells. The result was a pure population of human neural stem cells, the first such population ever purified so specifically or directly.

His co-authors on the paper are its first author, Su Wang, Ph.D., assistant professor of Neurology; Devin Chandler-Militello, senior technical associate; and Fraser Sim, Ph.D., assistant professor of Neurology at URMC, who recently established his own laboratory at the University of Buffalo. Other authors from the University include Gang Lu, Alex Zielke, Romane Auvergne, and Nancy Stanwood, M.D., associate professor of Obstetrics and Gynecology. Also contributing were Neeta Roy of Cornell University, Daniel Geschwind and Giovanni Coppola of the University of California at Los Angeles, and Silvia Nicolis of the University of Milano-Bicocca in Italy.

The work was supported by the Adelson Medical Research Foundation, the Mathers Charitable Foundation, the James S. McDonnell Foundation, the New York State Stem Cell Science Board, and the National Institute of Neurological Disorders and Stroke.

http://www.eurekalert.org/pub_releases/2010-12/uoc--lti120710.php

Life thrives in porous rock deep beneath the seafloor, scientists say

SANTA CRUZ, CA--Researchers have found compelling evidence for an extensive biological community living in porous rock deep beneath the seafloor.

The microbes in this hidden world appear to be an important source of dissolved organic matter in deep ocean water, a finding that could dramatically change ideas about the ocean carbon cycle.

Matthew McCarthy, associate professor of ocean sciences at the University of California, Santa Cruz, led a team of researchers from several institutions who analyzed the dissolved organic matter in fluids from natural vents on the seafloor and from a borehole that penetrated the basement rock deep beneath the seafloor sediments. Their results, to be published in the January issue of Nature Geoscience and currently available online, indicate that the dissolved material in those fluids was synthesized by microbes living in the porous basalt rock of the upper oceanic crust. These microbes are "chemoautotrophic," meaning they derive energy from chemical reactions and are completely independent of the sunlight-driven life on the surface of our planet.

Chemoautotrophic microbes (bacteria and archaea) have been found in deep-ocean sediments and at hydrothermal vents, where hot water flows out through newly formed volcanic rock at mid-ocean ridges. The idea that a much larger biological community might exist in habitats within the cooler upper-crustal rock that lies under large areas of the seafloor has been an exciting, but controversial, hypothesis, McCarthy said.

"What is really important about this is the huge size and extent of such systems," he said. "This study provides the strongest evidence yet that a really large biosphere exists in the warm fluids in the porous upper-oceanic crust. It's large not just in area, but in productivity. In the same way that forests and grasslands fix carbon and produce organic matter on land, our data suggest these microbes produce enough organic matter to export carbon to other systems. That's a real expansion of our ideas about the oceanic carbon cycle."

The existence of an extensive "alternate biosphere" beneath the ocean floor may also influence the thinking of astrobiologists about where life might exist elsewhere in our solar system, McCarthy said. Saturn's moon Europa, for example, is thought to have liquid oceans beneath its icy crust, prompting speculation about the possibility of life evolving there.

McCarthy's team found evidence of the hidden microbial ecosystem beneath the seafloor by analyzing carbon isotopes in the organic molecules in their samples. Of the three naturally occurring isotopes of carbon, carbon-12 is the most abundant, and both carbon-12 and the slightly heavier carbon-13 are stable. Carbon-14 is an unstable isotope formed in the upper atmosphere through the action of cosmic rays, and its steady decay is the basis for carbon-dating of organic material.

The ratios of these different isotopes provide telltale clues to the origins of organic molecules and the carbon atoms in them. Carbon-13 analysis, for example, indicates what kind of organisms synthesized the molecules. "Carbon-13 is really useful for looking at the origins of organic matter, because there are distinctive signatures for different sources," McCarthy said. "Chemosynthetic bacteria have wildly different signatures than anything else, and our carbon-13 results match the classic chemosynthetic values."

The team's carbon-14 analysis showed where the carbon in the organic molecules came from. If it came from the carbon in crustal rocks, there would be no carbon-14 at all. Instead, the carbon-14 signature indicated that the carbon came from dissolved inorganic carbon in deep seawater. This inorganic carbon pool consists of carbonate ions formed when carbon dioxide from the atmosphere dissolves in ocean water.

Carbon-14 dating indicated that the carbon in the dissolved organic matter is 11,800 to 14,400 years old--in other words, that's how long ago the carbon now in those organic molecules was absorbed from the atmosphere into the ocean. That's about three times older than the carbon-14 age of the overall pool of dissolved organic matter in the deep ocean. This suggests that water circulates very slowly through the deep microbial habitat in the rocks of the upper crust.

"The observation that this deep biosphere is apparently pumping very old, carbon-14-depleted dissolved organic matter into the deep ocean may be very important to our understanding of biogeochemical cycles," McCarthy said. "The reservoir of dissolved organic matter in the deep ocean is one of the largest active pools of organic carbon in the global carbon cycle, about the same size as the pool of atmospheric carbon dioxide."

The age of the deep-ocean water is used to estimate how quickly it turns over and returns to the surface layers. "If this very old pool of carbon is being mixed in and biasing the measurements, the deep-ocean water may actually be turning over more quickly than we thought," McCarthy said.

To obtain their samples, the researchers used custom-built equipment and a remotely operated deep-sea submersible, the ROV Jason II, from Woods Hole Oceanographic Institution (WHOI). Stainless-steel probes driven into an exposed rock outcrop and a specialized set of deep-sea sampling platforms designed at the University of Washington (UW) enabled them to recover the unprecedented quantities of uncontaminated crustal fluids needed for the analyses. The samples were collected during two expeditions to the Juan de Fuca Ridge system off the coast of Washington and British Columbia.

The key carbon-14 measurements on the recovered organic molecules were done through collaborations with the Lawrence Livermore National Laboratory's accelerator facility and the Keck Carbon Cycle Accelerator facility at UC Irvine. In addition to McCarthy, the coauthors include Steven Beaupré of WHOI; UCSC graduate student Brett Walker; Ian Voparil of Shell International Exploration and Production; Thomas Guilderson of Lawrence Livermore National Laboratory; and Ellen Druffel of UC Irvine. H. Paul Johnson and Tor Bjorkland of the UW School of Oceanography were instrumental in the development and deployment of deep-sea samplers and probes. This research was supported by the National Science Foundation, the University of California, and the Packard Foundation.

http://www.eurekalert.org/pub_releases/2010-12/aga-tbc120710.php

Tests between colonoscopies could be lifesaver for high-risk patients

Among patients with a family or past history of colorectal cancer (CRC), testing between colonoscopies helps detect CRC and advanced tumors that are either missed or develop rapidly, according to a new study in Gastroenterology, the official journal of the American Gastroenterological Association (AGA) Institute.

"By using fecal immunochemical testing - a new type of stool blood test - in the interval between surveillance colonoscopies, we were able to detect cancer much sooner than if we had waited for the scheduled surveillance," said Graeme P. Young, MD, AGAF, FRACP, of Flinders Medical Centre, Australia and lead author of the study. "In fact, in those patients who consistently returned a negative fecal immunochemical test, the chance of finding cancer or advanced adenoma was significantly reduced."

A joint guideline from the American Cancer Society, the U.S. Multi-Society Task Force on Colorectal Cancer and the American College of Radiology recommends that average-risk adults, beginning at the age of 50, should receive a colonoscopy every ten years and that annual fecal immunochemical tests (FIT) are acceptable choices for CRC screening in between this ten-year span (any positive FIT should be followed up with a colonoscopy).1 Guidelines suggest more frequent colonoscopies for certain high-risk groups.

In this study, 1,736 patients with a confirmed family or personal history of CRC were followed for 8,863 person years of surveillance; some for as long as 20 years. The study inclusion criteria required that patients had received at least an initial and one subsequent surveillance colonoscopy with adequate examination and retrieval of tissue, performed with a training-accredited colonoscopist present. In the 1,071 asymptomatic subjects who returned at least one FIT after the colonoscopies, the test detected 12 out of 14 cancers and 60 out of 96 advanced adenomas. In FIT-positive cases, the diagnosis was made sooner by 25 months for cancer and by 24 months for advanced adenomas before the regularly scheduled colonoscopy.

"Our study results suggest that interval fecal immunochemical testing in a high-risk colonoscopy program can be used for detecting missed or rapidly developing lesions," added Dr. Young.

Patients at increased risk for developing CRC due to a family history or past history of CRC are recommended to have colonoscopic surveillance at regular intervals, often more frequently than recommended for the average-risk population. Patients with only one or two small adenomas with low-grade dysplasia are recommended to have their second surveillance colonoscopy after an interval of 10 years. However, for these individuals, there is a greater risk of delay in detecting rapidly progressing or missed lesions. Using annual fecal occult blood tests in the interval between surveillance colonoscopies could be a strategy that helps manage

this risk. FIT, which uses an antibody specific for human hemoglobin, is being increasingly used because it is more sensitive for cancer and adenomas.

To learn more about CRC and FIT, visit the patient center on the AGA website at http://www.gastro.org/patient-center.

1. Levin B., Lieberman DA., McFarland B. et al. Screening and Surveillance for the Early Detection of Colorectal Cancer and Adenomatous Polyps, 2008: A Joint Guideline From the American Cancer Society, the US Multi-Society Task Force on Colorectal Cancer, and the American College of Radiology. Gastroenterology 2008 May;134(5):1570-95.

http://www.eurekalert.org/pub_releases/2010-12/luhs-rrs120710.php

Researchers reverse stroke damage by jumpstarting nerve fibers

MAYWOOD, Ill. - ***A new technique that jumpstarts the growth of nerve fibers could reverse much of the damage caused by strokes, researchers report in the Jan. 7, 2011 issue of the journal Stroke.***

"This therapy may be used to restore function even when it's given long after ischemic brain damage has occurred," senior author Gwendolyn Kartje, MD, PhD and colleagues write.

The article has been published online in advance of the print edition of Stroke. Kartje is director of the Neuroscience Institute of Loyola University Chicago Stritch School of Medicine and chief of neuroscience research at Edward Hines Jr. VA Hospital.

There currently is little doctors can do to limit stroke damage after the first day following a stroke. Most strokes are ischemic (caused by blood clots). A drug called tPA can limit damage, but must be given within the first three hours for the greatest benefit - and most patients do not receive treatment within that time window.

Kartje and colleagues report on a treatment called anti-Nogo-A therapy. Nogo-A is a protein that inhibits the growth of nerve fibers called axons. It serves as a check on runaway nerve growth that could cause a patient to be overly sensitive to pain, or to experience involuntary movements. (The protein is called Nogo because it in effect says "No go" to axons.) In anti-Nogo therapy, an antibody disables the Nogo protein. This allows the growth of axons into the stroke-affected side of the body and the restoration of functions lost due to stroke.

Kartje and colleagues report dramatic results of anti-Nogo therapy in rats that had experienced medically induced strokes. Researchers trained rats to reach and grab food pellets with their front paws. One week after experiencing a stroke, the animals all had significant deficits in grabbing pellets with their stroke-impaired limbs. There was little improvement over the next eight weeks.

Nine weeks after their stroke, six rats received anti-Nogo therapy, four rats received a control treatment consisting of an inactive antibody and five rats received no treatment. Nine weeks later, rats that had received anti-Nogo therapy regained 78 percent of their pre-stroke ability to grab pellets. By comparison, rats receiving no treatment regained 47 percent of their pre-stroke ability, and rats receiving the control treatment of inactive antibodies regained 33 percent of their pre-stroke performance. Subsequent examination of brain tissue found that the rats that received anti-Nogo therapy experienced significant sprouting of axons.

Researchers wrote that anti-nogo therapy "can induce remarkable compensatory sprouting and fiber growth, indicating the responsiveness of the chronically injured brain to form new neural networks under the proper growth conditions."

The findings "are of great clinical importance," researchers concluded. Anti-Nogo-A therapy "may benefit not only victims of spinal cord injury or patients in the early stage of stroke recovery, but also patients in later stages who suffer from neurological disability due to brain damage from stroke or other causes."

In a Phase I, multicenter trail at other centers, patients paralyzed by spinal cord injuries are receiving anti-Nogo therapy. The trial is sponsored by the pharmaceutical company Novartis.

Kartje's co-authors of the study in Stroke are first author Shih-Yen Tsai, MD, PhD and Catherine Papadopoulos, PhD, of Hines VA Hospital and Martin Schwab, PhD, of the University of Zurich.

The study was funded by the Department of Veterans Affairs and the National Institute of Neurological Disorders and Stroke.

http://www.eurekalert.org/pub_releases/2010-12/w-dae120310.php

Desensitisation approaches effective against hayfever-like allergies

Immunotherapy given as pills or drops under the tongue is a safe and effective way to treat hayfever-like allergies caused by pollen and dust mites, according to a new Cochrane Systematic Review.

The researchers say the approach is an attractive alternative to immunotherapy injections in children.

Common treatments for hayfever-like symptoms caused by allergies include antihistamines and nasal corticosteroids. If these prove unsuccessful, doctors may recommend immunotherapy, a desensitisation approach that involves exposing patients to increasing doses of an allergen. Traditionally immunotherapy was carried out by injection, but allergens are now also applied as pills or drops under the tongue.

Although a 2003 Cochrane review suggested sublingual immunotherapy was effective, the findings were based on a relatively small number of trials. Much more evidence is now available and the researchers were able to add another 38 studies to their current review, totalling 60 altogether. They included trials of pollen and

dust mites, as well as one trial of cat allergens. Sublingual immunotherapy significantly reduced symptoms of allergic rhinitis and requirements for medication compared to placebos. The results confirm the treatment is effective and has very few serious adverse effects.

The larger number of trials allowed the researchers to make stronger recommendations for use of sublingual immunotherapy in children. "This is an attractive approach for treating allergies in children. It is a more convenient alternative compared to injection immunotherapy," said Suzana Radulovic, one of the review authors, who is currently based at the Paediatric Allergy Research Department at St Thomas' Hospital in London, UK. "It is encouraging to see similar treatment effects in children compared to those in adults."

Overall, treatment effects comparable to those seen in the previous review provide greater reassurance for clinical practitioners. "Sublingual immunotherapy is an effective treatment for allergic rhinitis. With the inclusion of larger, better designed trials, we can be much more confident about the results," said Radulovic. "What we'd like to see now is more work on optimum dosage and treatment times."

http://www.eurekalert.org/pub_releases/2010-12/aiop-sam120610.php

Self-healing autonomous material comes to life

Washington, D.C. - ***You've seen it in movies: the human-like, robot assassin quickly regenerates its structure after being damaged beyond recognition. This "Terminator" scenario is becoming less far-fetched as recent advances in structural health monitoring systems have led to a variety of ways to identify damage to a structural system.***

Now, in the Journal of Applied Physics, researchers at Arizona State University have created a material that may be able to not only sense damage in structural materials, such as cracking in a fiber-reinforced composite, but to even heal it. The aim of developing "autonomous adaptive structures" is to mimic the ability of biological systems such as bone to sense the presence of damage, halt its progression, and regenerate itself.

The novel autonomous material developed by Henry Sodano and colleagues uses "shape-memory" polymers with an embedded fiber-optic network that functions as both the damage detection sensor and thermal stimulus delivery system to produce a response that mimics the advanced sensory and healing traits shown in biological systems. An infrared laser transmits light through the fiber-optic system to locally heat the material, stimulating the toughening and healing mechanisms.

The material system is capable of increasing the toughness of a specimen by 11 times. After toughening the specimen, the crack can be closed using the shape-memory effect to recover an unprecedented 96 percent of the object's original strength. In fact, after the crack is closed, the new material is nearly five times as tough as the original specimen, even though it has been strained past its original failure strain point by a factor of four. The material and healing process can be applied while the structure is in operation, which has not been possible with existing healing techniques.

The article, "Autonomous Materials with Controlled Toughening and Healing" by Michael Garcia, Yirong Lin, and Henry Angelo Sodano appears in the Journal of Applied Physics. See: http://link.aip.org/link/japiau/v108/i9/p093512/s1

http://www.eurekalert.org/pub_releases/2010-12/idso-ivs120610.php

Influenza virus strains show increasing drug resistance and ability to spread

Studies highlight need for new antiviral treatment options and strategies

Two new studies raise public health concerns about increasing antiviral resistance among certain influenza viruses, their ability to spread, and a lack of alternative antiviral treatment options. The findings are published in the January 1 issue of The Journal of Infectious Diseases. (Please see below for links to these articles online.)

Influenza viruses are treated with two classes of drugs: M2 blockers (adamantanes) and neuraminidase inhibitors (NAIs), including oseltamivir and zanamivir. While the spread of influenza strains with resistance to one class of drugs has been well documented in recent years, a new report from Larisa Gubareva, MD, PhD and colleagues at the Centers for Disease Control and Prevention (CDC) and at health agencies in West Virginia, Texas, and Canada, confirms that dual resistance can emerge in several ways and has been on the rise during the past three years.

The study analyzed 28 seasonal H1N1 viruses with dual resistance from 2008 to 2010 from five countries, revealing that additional antiviral resistance could rapidly develop in a previously single-resistant strain as a result of mutation, drug response, or gene exchange with another virus.

Although dual resistant viruses are still rare, the investigators noted an increase in the number of tested viruses with this resistance, from 0.06 percent (2007-2008) to 1.5 percent (2008-2009) to 28 percent (2009-2010); however, during the 2009-2010 season the number of circulating seasonal H1N1 viruses was low, and only 25 viruses were tested. "Because only two classes of antiviral agents are approved, the detection of viruses with resistance to drugs in both classes is concerning," said Dr. Gubareva. "If circulation of viruses with dual resistance becomes more widespread among any of the predominant circulating influenza A viruses, treatment

options will be extremely limited. New antiviral agents and strategies for antiviral therapy are likely to be necessary in the future."

A second study, conducted by Catherine Moore and colleagues in the United Kingdom, examined an outbreak of oseltamivir resistant (OR) pandemic H1N1 infection in a hematology unit in the UK. The study is the first to confirm person-to-person transmission of this dually resistant strain through molecular epidemiologic methods. The 2009 pandemic H1N1 virus was inherently resistant to adamantine, but was susceptible to and treated with oseltamivir. However, by October 2009, emergence of OR H1N1 had been documented in rare patients on oseltamivir therapy.

In the hematology unit that Moore and colleagues studied, eight of the 11 pandemic H1N1 virus infections were resistant to oseltamivir, with half of those cases resulting from direct transmission of the resistant virus. Immunocompromised patients were more susceptible to the emergence of OR H1N1 virus on treatment and also transmitted the virus to others, despite often having no influenza symptoms or having completed antiviral therapy. As a result, the screening of patients for OR H1N1 viruses became particularly important, and treatment guidelines were altered to include treatment with zanamivir, to which the viruses remained susceptible.

"These findings suggest that oseltamivir may not be the frontline drug of choice in hematology patients, and zanamivir may prove to be more beneficial," the study authors wrote. "Guidelines may need to be changed to include active screening for the [OR] mutation in hematology patients diagnosed with H1N1 and other patients who are immunocompromised when oseltamivir is used." If high risk groups are more actively monitored, early diagnosis will help prevent the spread of H1N1 viruses, and proper screening for infection and resistance will aid in making proper therapeutic decisions.

In an accompanying editorial, Frederick G. Hayden, MD, of the University of Virginia School of Medicine, and Menno D. de Jong, MD, of the University of Amsterdam in the Netherlands, agreed that increasingly detailed monitoring and creative preventive and therapeutic choices will be required as unpredictable and antiviral-resistant influenza viruses continue to appear. This is especially true "given our current paucity of therapeutic choices," according to the authors. With only two drug classes approved in the U.S. and most countries for treating influenza virus, future research should focus on the effectiveness of zanamivir and combination antiviral therapy and the need to develop new antivirals with unique mechanisms of action.

"Such information will ensure rapid development and testing of alternative antiviral strategies for use in immunocompromised hosts and seriously ill hospitalized patients to address their unmet medical needs and the associated public health concerns, particularly the continuing threat of antiviral resistance," the authors conclude.

The studies and the accompanying editorial are available online. They are embargoed until 2 p.m. EST on Tuesday, Dec. 7, 2010: "Dual Resistance to Adamantanes and Oseltamivir Among Seasonal Influenza A (H1N1) Viruses: 2008-2010" http://www.oxfordjournals.org/our_journals/jid/jiq005.pdf

"Evidence of Person to Person Transmission of Oseltamivir Resistant Pandemic Influenza A (H1N1) 2009 Virus in a Hematology Unit" http://www.oxfordjournals.org/our_journals/jid/jiq007.pdf

"Emerging Influenza Antiviral Resistance Threats" http://www.oxfordjournals.org/our_journals/jid/jiq012.pdf

http://news.bbc.co.uk/earth/hi/earth_news/newsid_9261000/9261713.stm

Giant bird found on hobbit island

By Emma Brennand Earth News reporter

A giant marabou stork has been discovered on an island once home to human-like 'hobbits'.

Fossils of the bird were discovered on the Indonesian island of Flores, a place previously famed for the discovery of Homo floresiensis, a small hominin species closely related to modern humans. The stork may have been capable of hunting and eating juvenile members of this hominin species, say researchers who made the discovery, though there is no direct evidence the birds did so. The finding, reported in the Zoological Journal of the Linnean Society, also helps explain how prehistoric wildlife adapted to living on islands.

Tall and heavy

The new species of giant stork, named Leptoptilos robustus, stood 1.8m tall and weighed up to 16kg researchers estimate, making it taller and much heavier than living stork species.

Palaeontologist Hanneke Meijer of the Smithsonian National Museum of Natural History in Washington DC, and affiliated to the National Museum of Natural History in Leiden, the Netherlands, made the discovery with colleague Dr Rokus Due of the National Center for Archaeology in Jakarta, Indonesia.

They found fossilised fragments of four leg bones in the Liang Bua caves on the island of Flores.

The bones, thought to be belong to a single stork, are between 20,000 to 50,000 years old, having been found in sediments dating to that age.

The giant bird is the latest extreme-sized species to be discovered once living on the island, which was home to dwarf elephants, giant rats and out-sized lizards, as well as humans of small stature.

"I noticed the giant stork bones for the first time in Jakarta, as they stood out from the rest of the smaller bird bones. Finding large birds of prey is common on islands, but I wasn't expecting to find a giant marabou stork," Dr Meijer told the BBC.

Only fragments of wing bones were found, but the researchers suspect the giant stork rarely, if at all, took flight.

Instead, the size and weight of its leg bones, and the thickness of the bone walls, suggest that the now extinct stork was so heavy that it lived most of its life on the ground. It is thought to have evolved from flying storks that colonised the relatively isolated island.

Artist's impression of the size of the giant stork next to a Homo floresiensis hobbit

"Flores has never been connected to mainland Asia and has always been isolated from surrounding islands. This isolation has played a key role in shaping the evolution of the Flores fauna," says Dr Meijer.

Many species on the islands evolved into either giants or dwarfs.

This phenomenon is known as the "island factor", and is thought to have been triggered by few mammalian predators being on the island. That led to abundant prey species becoming smaller, and other predators becoming larger. "Larger mammals, such as elephants and primates, show a distinct decrease in size, whereas the smaller mammals such as rodents, and birds, have increased in size," explains Dr Meijer.

Among the giants evolved the giant stork, and the giant rat, Papagomys armandvillei , as well as Komodo dragons, the largest surviving species of lizard. Dwarf species included the dwarfed elephant, Stegodon florensis insularis, and the human species , popularly known as the 'hobbit' H. floresiensis . Indeed, the remains of the giant stork were found in the same section of cave as the remains of H. floresiensis .

Discovered in 2004, H. floresiensis is thought to be a new human-like species standing just 1m tall, which survived until around 17,000 years ago. It is thought to be descended from a prehistoric species of human - perhaps H. erectus - which reached island South-East Asia more than a million years ago.

"The status of this human contemporary has been subject of intense debate since its discovery," says Dr Meijer. "But in my opinion, the associated fauna is crucial in understanding the evolution of H. floresiensis ."

The distinct difference in size between the 1.8 m-tall giant stork L. robustus and 1m-tall the tiny hominin H. floresiensis raises some interesting questions.

Would the hominin have eaten the giant stork? Direct evidence of H. floresiensis 's diet is hard to come by, but it is suspected of hunting animals on the island for meat. However, modern marabou storks mainly eat carrion, but they do take fish, frogs, and small mammals and birds.

So would the giant stork eaten the hominin? "Whether or not this animal may have eaten hobbits is speculative: there is no evidence for that," Dr Meijer told the BBC. "But can not be excluded either."

The giant storks towered over the hobbits. More importantly, juvenile hobbits were no bigger than giant rats that existed on the island, which themselves may have fallen prey to the giant stork, she adds.

As yet is it unclear why the giant stork, and the pygmy elephants and hobbit hominins, went extinct. "But we have several clues," says Dr Meijer. "All the bones of the giant marabou as well as those of the pygmy elephants and the hobbits are found below a thick layer of volcanic ash," suggesting a recent volcanic eruption. "Second, the giant marabou and its contemporaries go extinct right before modern humans appear at the cave."

Around 15,000 years ago, the climate of Flores went from dry to being wetter, and a combination of any of these factors may have been enough to drive species on the islands to extinction.

http://www.physorg.com/news/2010-12-tooth-breakthrough-dental-plaque.html

Eliminating tooth decay: Breakthrough in dental plaque research

Dutch professors Bauke Dijkstra and Lubbert Dijkhuizen have deciphered the structure and functional mechanism of the glucansucrase enzyme that is responsible for dental plaque sticking to teeth.

This knowledge will stimulate the identification of substances that inhibit the enzyme. Just add that substance to toothpaste, or even sweets, and caries will be a thing of the past. The results of the research have been published this week in the journal Proceedings of the National Academy of Sciences (PNAS).

The University of Groningen researchers analysed glucansucrase from the lactic acid bacterium Lactobacillus reuteri, which is present in the human mouth and digestive tract. The bacteria use the glucansucrase enzyme to convert sugar from food into long, sticky sugar chains. They use this glue to attach

themselves to tooth enamel. The main cause of tooth decay, the bacterium Streptococcus mutans, also uses this enzyme. Once attached to tooth enamel, these bacteria ferment sugars releasing acids that dissolve the calcium in teeth. This is how caries develops.

Using protein crystallography, the researchers were able to elucidate the three dimensional (3D) structure of the enzyme. The Groningen researchers are the first to succeed in crystallizing glucansucrase. The crystal structure has revealed that the folding mechanism of the protein is unique. The various domains of the enzyme are not formed from a single, linear amino acid chain but from two parts that assemble via a U-shaped structure of the chain; this is the first report on such a folding mechanism in the literature.

The unravelling of the 3D structure provided the researchers with detailed insight into the functional mechanism of the enzyme. The enzyme splits sucrose into fructose and glucose and then adds the glucose molecule to a growing sugar chain. Thus far the scientific community assumed that both processes were performed by different parts of the enzyme. However, the model created by the Groningen researchers has revealed that both activities occur in the same active site of the enzyme.

Dijkhuizen expects that specific inhibitors for the glucansucrase enzyme may help to prevent attachment of the bacteria to the tooth enamel. Information about the structure and functional mechanism of the enzyme is crucial for developing such inhibitors. Thus far, such research has not been successful, states Dijkhuizen: 'The various inhibitors studied not only blocked the glucansucrase, but also the digestive enzyme amylase in our saliva, which is needed to degrade starch.'

The crystal structure also provides an explanation for this double inhibition. The data published by the Groningen scientists shows that glucansucrase proteins most likely evolved from amylase enzymes that degrade starch. 'We already knew that the two enzymes were similar', says Dijkhuizen, 'but the crystal structure revealed that the active sites are virtually identical. Future inhibitors thus need to be directed towards very specific targets because both enzymes are evolutionary closely related.'

Dijkhuizen points out that in future glucansucrase inhibitors may be added to toothpaste and mouthwash. 'But it may even be possible to add them to sweets', he suggests. 'An inhibitor might prevent that sugars released in the mouth cause damage.' However, Dijkhuizen doesn't expect that toothbrushes have had their day: 'it will always be necessary to clean your teeth.'

More information: *Remarkable fold of a 117 kDa glucansucrase fragment: Insights into evolution and product specificity of GH70 enzymes. Authors: Andreja Vujičić-Žagar, Tjaard Pijning, Slavko Kralj, Cesar A. López, Wieger Eeuwema, Lubbert Dijkhuizen and Bauke W. Dijkstra. PNAS, 30 November 2010. The article is published at: http://www.pnas.or ... s.1007531107*

Provided by University of Groningen

http://www.eurekalert.org/pub_releases/2010-12/uob-sdb120110.php

Scientists discover brain's inherent ability to focus learning

Medical researchers have found a missing link that explains the interaction between brain state and the neural triggers responsible for learning, potentially opening up new ways of boosting cognitive function in the face of diseases such as Alzheimer's as well as enhancing memory in healthy people.

Much is known about the neural processes that occur during learning but until now it has not been clear why it occurs during certain brain states but not others. Now researchers from the University of Bristol have been able to study, in isolation, the specific neurotransmitter which enhances learning and memory.

Acetylcholine is released in the brain during learning and is critical for the acquisition of new memories. Its role is to facilitate the activity of NMDA receptors, proteins that control the strength of connections between nerve cells in the brain.

Currently, the only effective treatment for the symptoms of cognitive impairment seen in diseases such as Alzheimer's is through the use of drugs that boost the amount of acetylcholine release and thereby enhance cognitive function.

Describing their findings in the journal Neuron, researchers from Bristol's School of Physiology and Pharmacology have shown that acetylcholine facilitates NMDA receptors by inhibiting the activity of other proteins called SK channels whose normal role is to restrict the activity of NMDA receptors.

This discovery of a role for SK channels provides new insight into the mechanisms underlying learning and memory. SK channels normally act as a barrier to NMDA receptor function, inhibiting changes in the strength of connections between nerve cells and therefore restricting the brain's ability to encode memories. Findings from this latest research show that the SK channel barrier can be removed by the release of acetylcholine in the brain in order to enhance our ability to learn and remember information.

Lead researcher Dr Jack Mellor, from the University of Bristol's Medical School, said: "These findings are not going to revolutionise the treatment of Alzheimer's disease or other forms of cognitive impairment

overnight. However, national and international funding bodies have recently made research into aging and dementia a top priority so we expect many more advances in our understanding of the mechanisms underlying learning and memory in both health and disease."

The team studied the effects of drugs that target acetylcholine receptors and SK channels on the strength of connections between nerve cells in animal brain tissue. They found that changes in connection strength were facilitated by the presence of drugs that activate acetylcholine receptors or block SK channels revealing the link between the two proteins.

Dr Mellor added: "From a therapeutic point of view, this study suggests that certain drugs that act on specific acetylcholine receptors may be highly attractive as potential treatments for cognitive disorders. Currently, the only effective treatments for patients with Alzheimer's disease are drugs that boost the effectiveness of naturally released acetylcholine. We have shown that mimicking the effect of acetylcholine at specific receptors facilitates changes in the strength of connections between nerve cells. This could potentially be beneficial for patients suffering from Alzheimer's disease or schizophrenia."

The research team involved the University of Bristol's MRC Centre for Synaptic Plasticity and the Division of Neuroscience in the School of Physiology & Pharmacology, part of the Bristol Neuroscience network. This work was supported by the Wellcome Trust, MRC, BBSRC and GSK.

***Paper:** Facilitation of Long-Term Potentiation by Muscarinic M1 Receptors is mediated by inhibition of SK channels, by Buchanan KA, Petrovic MM, Chamberlain SEL, Marrion NV & Mellor JR in Neuron.*

http://www.eurekalert.org/pub_releases/2010-12/idso-ssc120810.php

Study suggests cranberry juice not effective against urinary tract infections

Drinking cranberry juice has been recommended to decrease the incidence of urinary tract infections, based on observational studies and a few small clinical trials.

However, a new study published in the January 1 issue of Clinical Infectious Diseases, and now available online (http://cid.oxfordjournals.org/content/52/1/23.full), suggests otherwise.

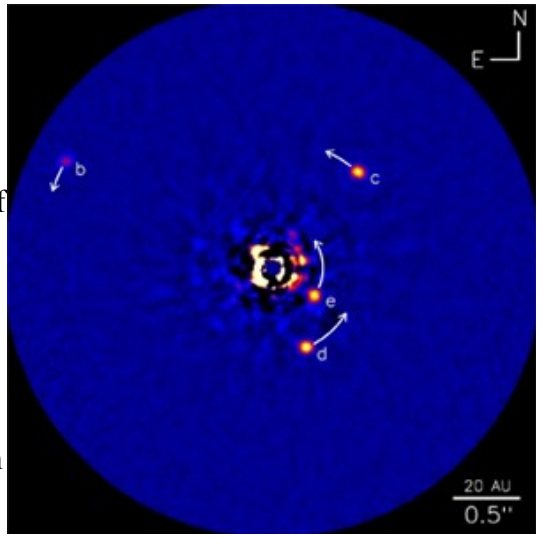
College-aged women who tested positive for having a urinary tract infection were assigned to drink eight ounces of cranberry juice or a placebo twice a day for either six months or until a recurrence of a urinary tract infection, whichever happened first. Of the participants who suffered a second urinary tract infection, the cranberry juice drinkers had a recurrence rate of almost 20 percent, while those who drank the placebo suffered only a 14 percent recurrence.

"We assumed that we would observe a 30 percent recurrence rate among the placebo group. It is possible that the placebo juice inadvertently contained the active ingredients that reduce urinary tract infection risk, since both juices contained Vitamin C," explained study author Betsy Foxman, PhD, of the University of Michigan School of Public Health in Ann Arbor. She added, "Another possibility is that the study protocol kept participants better hydrated, leading them to urinate more frequently, therefore decreasing bacterial growth and reducing urinary tract infection symptoms."

http://www.eurekalert.org/pub_releases/2010-12/uoc--adi120810.php

Astronomers discover, image new planet in planetary system very similar to our own

An international team of astronomers has discovered and imaged a fourth giant planet outside our solar system, a discovery that further strengthens the remarkable resemblances between a distant planetary system and our own.



The research is published Dec. 8 in the advance online version of the journal Nature. The astronomers say the planetary system resembles a supersized version of our solar system.

"Besides having four giant planets, both systems also contain two 'debris belts' composed of small rocky or icy objects, along with lots of tiny dust particles," said Benjamin Zuckerman, a UCLA professor of physics and astronomy and co-author of the Nature paper.

Our giant planets are Jupiter, Saturn, Uranus and Neptune, and our debris belts include the asteroid belt between the orbits of Mars and Jupiter and the Kuiper Belt, beyond Neptune's orbit.

The newly discovered fourth planet (known as HR 8799e) orbits a bright star called HR 8799, which lies some 129 light years from Earth and is faintly visible to the naked eye. The mass of the HR 8799 planetary system is much greater than our own. Astronomers estimate that the combined mass of the four giant planets may be 20 times greater than the mass of all the planets in our solar system, and the debris belt counterparts also contain much more mass than our own.

The new planet joins three previously discovered planets that were the subjects of a 2008 paper in the journal Science reporting the first-ever images of a planetary family orbiting a star other than our sun. Four of the co-authors of the new Nature paper, including Zuckerman, were also co-authors on that Science paper.

"This is the fourth imaged planet in this planetary system, and only a tiny percentage of known exoplanets (planets outside our solar system) have been imaged; none has been imaged in multiple-planet systems other than those of HR 8799," Zuckerman said.

All four planets orbiting HR 8799 are similar in size, likely between five and seven times the mass of Jupiter. The newly discovered planet orbits HR 8799 more closely than the other three. If it were in orbit around our sun, astronomers say, it would lie between the orbits of Saturn and Uranus.

The astronomers used the Keck II telescope at Hawaii's W.M. Keck Observatory to obtain images of the fourth planet. Zuckerman's colleagues are from Canada's National Research Council (NRC), Lawrence Livermore National Laboratory (LLNL) in California, and Lowell Observatory in Arizona.

"We reached a milestone in the search for other worlds in 2008 with the discovery of the HR 8799 planetary system," said Christian Marois, an NRC astronomer and lead author of the Nature paper. "The images of this new inner planet are the culmination of 10 years' worth of innovation, making steady progress to optimize every aspect of observation and analysis. This allows us to detect planets located ever closer to their stars and ever further from our own solar system."

"The four massive planets pull on each other gravitationally," said co-author Quinn Konopacky, a postdoctoral researcher at LLNL. "We don't yet know if the system will last for billions of years or fall apart in a few million more. As astronomers carefully follow the HR 8799 planets during the coming decades, the question of the stability of their orbits could become much clearer."

The origin of these four giant planets remains a puzzle; neither of the two main models of planet formation can account for all four. "There's no simple model that can form all four planets at their current location," said co-author Bruce Macintosh of LLNL. "It's going to be a challenge for our theoretical colleagues."

It is entirely plausible that this planetary system contains additional planets closer to the star than these four planets, quite possibly rocky, Earth-like planets, Zuckerman said. But such interior planets are far more difficult to detect, he added.

"Images like these bring the exoplanet field, which studies planets outside our solar system, into an era of exoplanet characterization," said co-author Travis Barman, a Lowell Observatory exoplanet theorist. "Astronomers can now directly examine the atmospheric properties of four giant exoplanets that are all the same young age and that formed from the same building materials."

Detailed study of the properties of HR 8799e will be challenging due to the planet's relative faintness and its proximity to its star. To overcome those limitations, Macintosh is leading an effort to build an advanced exoplanet imager, called the Gemini Planet Imager, for the Gemini Observatory. This new instrument will physically block the starlight and allow quick detection and detailed characterization of planets similar to HR 8799e. UCLA and the NRC are also contributing to Gemini Planet Imager.

James Larkin, a UCLA professor of physics and astronomy, is building a major component of the imager, which is scheduled to arrive at the Gemini South Telescope in Chile late next year.

The research reported in Nature was funded by NASA, the U.S. Department of Energy and the National Science Foundation Center for Adaptive Optics. For more information, visit the NRC's website at www.nrc-cnrc.gc.ca.

http://www.eurekalert.org/pub_releases/2010-12/sfts-rsc120810.php

Reproductive scientists create mice from 2 fathers

Using stem cell technology, reproductive scientists in Texas, led by Dr. Richard R. Berhringer at the M.D. Anderson Cancer Center, have produced male and female mice from two fathers.

The study was posted today (Wednesday, December 8) at the online site of the journal Biology of Reproduction.

The achievement of two-father offspring in a species of mammal could be a step toward preserving endangered species, improving livestock breeds, and advancing human assisted reproductive technology (ART). It also opens the provocative possibility of same-sex couples having their own genetic children, the researchers note.

In the work reported today, the Behringer team manipulated fibroblasts from a male (XY) mouse fetus to produce an induced pluripotent stem (iPS) cell line. About one percent of iPS cell colonies grown from this XY cell line spontaneously lost the Y chromosome, resulting in XO cells. The XO iPS cells were injected into blastocysts from donor female mice. The treated blastocysts were transplanted into surrogate mothers, which gave birth to female XO/XX chimeras having one X chromosome from the original male mouse fibroblast.

The female chimeras, carrying oocytes derived from the XO cells, were mated with normal male mice. Some of the offspring were male and female mice that had genetic contributions from two fathers.

According to the authors, "Our study exploits iPS cell technologies to combine the alleles from two males to generate male and female progeny, i.e. a new form of mammalian reproduction."

The technique described in this study could be applied to agriculturally important animal species to combine desirable genetic traits from two males without having to outcross to females with diverse traits.

"It is also possible that one male could produce both oocytes and sperm for self-fertilization to generate male and female progeny," the scientists point out. Such a technique could be valuable for preserving species when no females remain.

In the future, it may also be possible to generate human oocytes from male iPS cells in vitro. Used in conjunction with in vitro fertilization, this would eliminate the need for female XO/XX chimeras, although a surrogate mother would still be needed to carry the two-father pregnancy to term.

Using a variation of the iPS technique, the researchers say "it may also be possible to generate sperm from a female donor and produce viable male and female progeny with two mothers."

The authors also caution that the "generation of human iPS cells still requires significant refinements prior to their use for therapeutic purposes."

http://www.eurekalert.org/pub_releases/2010-12/uocp-lcu120810.php

Lost civilization under Persian Gulf?

A once fertile landmass now submerged beneath the Persian Gulf may have been home to some of the earliest human populations outside Africa, according to an article published today in Current Anthropology.

Jeffrey Rose, an archaeologist and researcher with the University of Birmingham in the U.K., says that the area in and around this "Persian Gulf Oasis" may have been host to humans for over 100,000 years before it was swallowed up by the Indian Ocean around 8,000 years ago. Rose's hypothesis introduces a "new and substantial cast of characters" to the human history of the Near East, and suggests that humans may have established permanent settlements in the region thousands of years before current migration models suppose.

In recent years, archaeologists have turned up evidence of a wave of human settlements along the shores of the Gulf dating to about 7,500 years ago. "Where before there had been but a handful of scattered hunting camps, suddenly, over 60 new archaeological sites appear virtually overnight," Rose said. "These settlements boast well-built, permanent stone houses, long-distance trade networks, elaborately decorated pottery, domesticated animals, and even evidence for one of the oldest boats in the world."

But how could such highly developed settlements pop up so quickly, with no precursor populations to be found in the archaeological record? Rose believes that evidence of those preceding populations is missing because it's under the Gulf.

"Perhaps it is no coincidence that the founding of such remarkably well developed communities along the shoreline corresponds with the flooding of the Persian Gulf basin around 8,000 years ago," Rose said. "These new colonists may have come from the heart of the Gulf, displaced by rising water levels that plunged the once fertile landscape beneath the waters of the Indian Ocean."

Historical sea level data show that, prior to the flood, the Gulf basin would have been above water beginning about 75,000 years ago. And it would have been an ideal refuge from the harsh deserts surrounding it, with fresh water supplied by the Tigris, Euphrates, Karun, and Wadi Baton Rivers, as well as by underground springs. When conditions were at their driest in the surrounding hinterlands, the Gulf Oasis would have been at its largest in terms of exposed land area. At its peak, the exposed basin would have been about the size of Great Britain, Rose says.

Evidence is also emerging that modern humans could have been in the region even before the oasis was above water. Recently discovered archaeological sites in Yemen and Oman have yielded a stone tool style that is distinct from the East African tradition. That raises the possibility that humans were established on the southern part of the Arabian Peninsula beginning as far back as 100,000 years ago or more, Rose says. That is far earlier than the estimates generated by several recent migration models, which place the first successful migration into Arabia between 50,000 and 70,000 years ago.

The Gulf Oasis would have been available to these early migrants, and would have provided "a sanctuary throughout the Ice Ages when much of the region was rendered uninhabitable due to hyperaridity," Rose said. "The presence of human groups in the oasis fundamentally alters our understanding of human emergence and cultural evolution in the ancient Near East."

It also hints that vital pieces of the human evolutionary puzzle may be hidden in the depths of the Persian Gulf.

Jeffrey I. Rose, "New Light on Human Prehistory in the Arabo-Persian Gulf Oasis." Current Anthropology 51:6 (December 2010).

http://news.discovery.com/human/haiti-cholera-epidemic-linked-un.html

Haiti Cholera Outbreak Linked To UN Camp

The cholera outbreak ravaging Haiti began at a camp for UN peacekeepers from Nepal, according to new report.

The cholera outbreak ravaging Haiti began at a camp for UN peacekeepers from Nepal, according to an expert report submitted to the French foreign ministry, a source close to the matter told AFP on Tuesday.

Respected French epidemiologist Professor Renaud Piarroux conducted a study in Haiti last month and concluded the epidemic began with an imported strain of the disease that could be traced back to the Nepalese base, the official said.

"The source of the infection came from the Nepalese camp," the source told AFP, speaking on condition on anonymity as he was not authorized to discuss a report that has not yet been made public. "The starting point has been very precisely localized," he said, pointing to the UN base at Mirebalais on the Artibonite river in central Haiti. “There is no other possible explanation given that there was no cholera in the country, and taking into account the intensity and the speed of the spread and the concentration of bacteria in the Artibonite delta," he said. "The most logical explanation is the massive introduction of fecal matter into the Artibonite river on a single occasion," the source added.

The United Nations, which has faced violent protests in Haiti over its alleged role in an outbreak that has already killed 2,000 people and made 90,000 sick, insists there is no evidence that its troops were to blame.

Foreign ministry spokesman Bernard Valero did not reveal the conclusion of the report, but confirmed the foreign ministry had received a copy and said it had been passed on to the United Nations for investigation.

"From the outbreak of the epidemic, France sent to Haiti at the request of the Haitian health ministry one of its best cholera specialists, Professor Piarroux, a head of department in Marseille's public hospitals," he said.

Cholera has added to the woes of the impoverished Caribbean nation, which was devastated by a massive earthquake in January that killed a quarter of a million people and left 1.3 million living in ramshackle refugee camps. Piarroux discussed his report in an interview with AFP last month. He did not directly blame the Nepalese, but said the cholera was from abroad.

"It started in the center of the country, not by the sea, nor in the refugee camps. The epidemic can't be of local origin. That's to say, it was imported," he said, shortly after his return from Haiti.

Haitian officials say the first cases of cholera, a waterborne illness, broke out on the banks of the Artibonite river, downstream of the UN base.

Last month, Edmond Mulet, head of the United Nations mission in Haiti, said no UN soldier, police officer nor civilian official had tested positive for cholera, and he defended the Nepalese, who have been the target of protests. All samples taken from the latrines, kitchens and water supply at the suspect Nepalese camp have proved negative, Mulet said. "There is no scientific evidence that the camp at Mirebalais is the source of this epidemic," he said, complaining of "a lot of disinformation, a lot of rumors around this situation."

But Piarroux - who works at the University of the Mediterranean in Marseille - told AFP that the outbreak was not linked to the earthquake devastation, and could not have come from a Haitian environmental source.

"The epidemic exploded in an extremely violent way on Oct. 19, with several thousand cases and several hundreds deaths after many people drank the water of the Artibonite delta," he said.

The professor said the world had not seen cholera spread so quickly since an outbreak in Goma, in eastern Congo, in 1994. "We've had more than 70,000 cases, and we could easily see them hit 200,000," he warned.

Cholera is caused by bacteria spread in contaminated water or food, often through faeces. If untreated, it can kill within a day through dehydration, with the old and the young the most vulnerable.

http://sciencenews.org/view/generic/id/67029/title/Just_warm_enough

Just warm enough

Mammals' body temperatures may represent balance between warding off fungi and limiting food needs

By Tina Hesman Saey

Fungi may be to thank for mammals’ warm blood, a new theory suggests. But exactly how hot-blooded an animal is may depend on balancing fungal protection with food consumption.

The optimum body temperature for organisms to ward off fungal infections without burning too much energy is 36.7˚ Celsius - close to the core body temperatures of mammals, including humans, researchers at Albert Einstein College of Medicine in New York City reported online November 9 in mBio. The finding is the latest piece of evidence for a theory that fungi may have been a driving force in the evolution of mammalian body temperatures. The new mathematical analysis also helps explain why mammals aren’t even hotter.

"Mammals don't make any sense," says Arturo Casadevall, microbiologist at Einstein who devised the theory. "We have to eat all the time. Our reproduction rate is low." In fact, until catastrophic events caused the extinction of the dinosaurs, "mammals were an experiment that wasn't going anywhere," he says.

Casadevall wondered why reptiles didn't retake control of the Earth once environmental conditions had stabilized again.

A couple of pieces of evidence led him to develop the new theory. First, a massive fungal bloom swept the Earth about the time of the dinosaur extinction. "The world became a huge a compost pile," he says.

Second, fungi plague plants, insects and other cold-blooded creatures far more often than they do mammals or birds. Putting two and two together, he formulated a theory that the warm body temperatures of mammals and birds might have protected them from fungal pathogens, while diseases caused by fungi might have been a factor keeping the reptiles from rising again.

Mammalian and bird body temperatures

Species	Body Temp. (degrees Celsius)
Human	37
Baboon	38.1
Cactus mouse	36.6
California mouse	36.4
Humpback whale	36
Fur seal	38
Echidna	30.7
Chicken	39.8
Rabbit	38.3–39.4

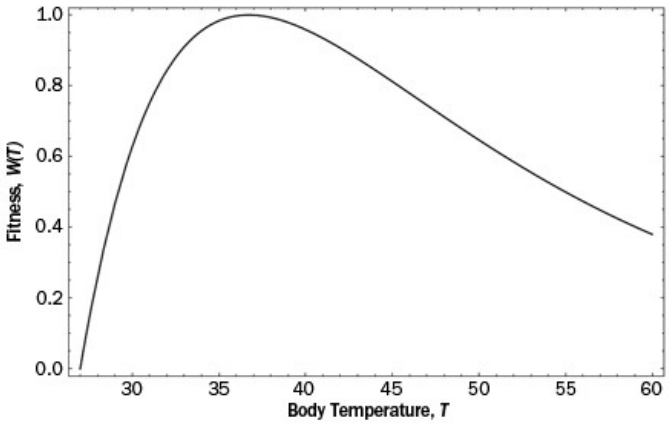
Mammals have a range of body temperatures, but most hover around 37° Celsius. Such warm bodies help protect against fungal infections, but being hotter means eating a lot more. A new study finds that 36.7°C is the optimal body temperature for striking a balance between the two. **SOURCE: C. Ladd Prosser, ed. Environmental and Metabolic Animal Physiology, 4th ed. Wiley-Liss, 1991**

"We are cautiously suggesting that fungi may have been responsible for the success of the mammals," he says.

To test the theory, Casadevall and Vincent Robert of the CBS Fungal Biodiversity Center in Utrecht, the Netherlands, measured the thermal tolerance of 4,802 types of fungi. For every degree Celsius the researchers raised the temperature above 30˚ C, 6 percent fewer fungal species could grow, the team reported last year in the Journal of Infectious Diseases.

Most mammals have body temperatures of about 37˚ (98.6˚ Fahrenheit). But if higher temperatures ward off more fungi, why don't mammals run even hotter?

In the new paper, Casadevall and coauthor Aviv Bergman, an evolutionary systems biologist also at Einstein, attempted to answer the question with a mathematical model. Mammalian body temperature is a trade-off between fighting fungi and burning too much fuel, they found. "If you were to go higher, you'd have more protection, but then you'd have to eat a lot more," Casadevall says.



Researchers calculated an organism's fitness as a function of body temperature, revealing 36.7°C as the ideal body temperature. Fitness - designated W(T) above - represents the balance between the benefit of fighting of fungal pathogens and the energy costs ofmaintaining a higher body temperature. **A. Bergman & A. Casadevall/mBio 2010**

Their model doesn't address all the biological questions related to mammalian body temperature, says Bergman, but it does suggest that threats from fungi could impose constraints on some aspects of mammalian evolution.

"I think it's a really cool idea," says Leah Cowen, a medical mycologist at the University of Toronto. What's striking about the new study is that the model is simple, "but the vision is large," potentially answering a huge question in evolutionary biology. "This is a big picture question addressed by a simple mathematical model."

The real mark of a good model is whether it can make predictions, says Joseph Heitman, a microbiologist and geneticist at Duke University. This model is "really creative and a bit out there," he says, but "one of the beauties of it is that it is fairly straightforward."

One might predict from this model that raising an animal's temperature would lead to greater resistance to fungi. Lowering body temperature would then be expected to make animals more vulnerable to fungal infections. Frogs and other amphibians in decline around the world - in part because of infections with a chytrid fungus - may provide some evidence that the theory is correct. Warming up infected frogs can help clear them of the fungus, Heitman says.

Reducing a mammal's temperature in the laboratory to find out whether lower body temperatures lead to fungal disease is difficult because messing with body temperature can affect many other biological processes. But hibernating bats may provide a clue that Casadevall is onto something, says David Blehert, a microbiologist with the U.S. Geological Survey's National Wildlife Health Center in Madison, Wis.

Blehert studies white-nose syndrome, a fungal disease that is killing bats in large numbers in the eastern United States. A fungus called Geomyces destructans infects bats while they are hibernating - a time when body temperatures drop from 40˚ C to about 7˚. "They're not warm-blooded when they get infected," Blehert says. When bats are up and around and at their normal body temperature, they seem impervious to the infection, he says.

In a report published November 11 in BMC Biology, Blehert and others described how the fungus, which erodes and replaces the bat's skin, damages wings and leads to death. Casadevall's idea has "become important in our thinking about this disease," Blehert says.

The idea of a link between fungal disease and body temperature is not controversial among scientists, Blehert says. "It's very logical."

http://www.bbc.co.uk/news/science-environment-11942451

'Diamond exoplanet' idea boosted by telescope find

By Pallab Ghosh Science correspondent, BBC News

A US-British team of astronomers has discovered the first planet with ultra-high concentrations of carbon.

The researchers say their discovery supports the idea there may be carbon-rich, rocky planets whose terrains are made up of diamonds or graphite.

"You might see land masses and mountains made up of diamonds," the lead researcher Dr Nikku Madhusudhan told BBC News. The study in Nature journal raises new questions about how planets are formed.

The work has been described as an astonishing astronomical tour de force. They have detected the thermal radiation (heat) from a planet 1,200 light years away using Nasa's Spitzer Space Telescope.

From this information they have calculated the composition of its atmosphere, according to Dr Marek Kukula of the Royal Greenwich Observatory in London.

Out of this world

"It is absolutely astonishing that these scientists are able to start to tease out the details of what planets around other stars are made of," he said.

"The planet is thousands of times fainter than the star it orbits. So the scientists have to perform an amazing feat of precision measurement to extract anything at all. The fact that they are able to tell us something about the composition of this particular planet is quite literally out of this world."

To date astronomers have discovered more than 500 planets around other stars. These distant worlds are known as exoplanets. It is only recently that instruments and analysis methods have become powerful enough to discern their composition.

This new planet, Wasp 12b, is the first to have more carbon than oxygen. It is a so-called gas giant, like Jupiter, and is mostly made from hydrogen gas. But the planet's core could be composed of some form of diamond, graphite and other carbon compounds, possibly in liquid form.

Tar pools

This discovery suggests there may well be many Earth-sized planets in our galaxy that are ultra-rich in carbon.

But these worlds would be unlike our planet: "Theoretical studies suggest that they could be dominated by diamond and graphite rocks," according to Dr Madhusudhan.

"That would mean that in the mountains, a large fraction of the rock mass could instead be made of diamonds and lots of land masses rich in diamonds, much more than we see on Earth."

These planets would be lacking in water So, if temperatures were sufficiently high, liquid on their surface would consist of carbon-rich compounds, such as tar, he says.

So how common are these diamond planets? The short answer is that astronomers simply don't know. But the fact that they've discovered one means that they'll now start to try and find an answer. Dr Madhusudhan believes that they could be common.

"It's my strong belief that a fair fraction of the exoplanets we have discovered could be carbon-rich and it's a very interesting thought that on such rocky planets, sand could be a rare commodity and diamonds would be plentiful. The more important question is how such planets could form."

An immediate question that is raised is why Wasp 12b is so much higher in carbon than the planets we know about. The prevalent theory is that plenty of water ice was available when the planets in our Solar System formed. That could not have been the case for Wasp 12b.

http://news.discovery.com/human/aging-free-radicals-antioxidants.html

Do Free Radicals Really Cause Aging?

These much maligned molecules may not be entirely harmful after all. In fact, a new study suggests they could help us live longer.

By Jessica Marshall

Conventional wisdom has held for decades that free radicals cause aging, and that antioxidants, which squelch the reactivity of these highly reactive molecules, are a way to slow the process. But new work adds to a growing body of research that suggests the story is not so simple.

In the new study published in PLoS Biology, worms that made more free radicals or that were treated with a free-radical-producing herbicide actually lived longer than normal worms. What's more, when the longer-lived mutant worms were given antioxidants, the effects were reversed, and the worms had a conventional worm lifespan. The finding flies in the face of the idea that antioxidants battle the effects of aging.

According to study author Siegfried Hekimi of McGill University in Montreal and others, what is emerging from this and other experiments is a view of free radicals - or, more precisely, reactive oxygen species - as a normal part of the body's stress response, with beneficial effects at certain levels.

"Maybe the reason why free radicals and aging are correlated is because free radical production in the mitochondria (part of the cell) is a stress reaction to the damage of aging," Hekimi said. "The organism tries to counter with free radical production." Hekimi and others point out that part of exercise's benefit may be because exercise causes mild increases in the levels of reactive oxygen species that are actually good for us.

The emerging view casts a pall on the idea of popping antioxidant pills in hopes of slowing the aging process or protecting against disease. "When clinical trials have been done with antioxidants, they have not shown benefits," Hekimi said. "If we're right that reactive oxygen species are fundamental to maintain normal fitness and also adaptation to stress, then you don't want to take too many antioxidants," said Navdeep Chandel of Northwestern Medical School in Chicago.

Indeed, Chandel suspects that the beneficial effects of limited alcohol consumption come not from antioxidants in red wine but from the mild oxidative stress the alcohol provides.

"Who am I to say if you should take antioxidants or not," he added. "All I would say is there is no evidence that taking more antioxidants than you get through diet is needed."

Free radicals do cause damage, Hekimi said, but at normal levels their beneficial effects are perhaps more important. If the stress of aging or disease increases sufficiently, he said, the damage caused by the free radicals might overwhelm their positive effects.

"You cannot live without them, nor should you wish to, but they will probably help to kill you in the end," agreed Barry Halliwell of the National University of Singapore, of reactive oxygen species. "Learning how to stop the latter whilst preserving the useful functions of reactive oxygen species should be a major research priority in the next few years." Halliwell said that evidence supports that reactive oxygen species probably contribute to the progression of cancer and neurodegenerative diseases, despite having beneficial effects at lower levels. They also probably cause skin wrinkling, he added.

Hekimi hopes further experiments will determine exactly how reactive oxygen species increase lifespan in the worms. He and his colleagues used the nematode worm Caenorhabditis elegans, an organism used widely in lab studies, but Hekimi believes the findings will translate into higher organisms like mice and humans, because these systems are so fundamental.

Halliwell noted, though, that C. elegans can not be used to study the effect of free radicals on stem cells, which evidence suggests may be important. Also, the study only shows the effects of free radicals on longevity, and can say nothing about quality of life.

http://www.eurekalert.org/pub_releases/2010-12/luhs-tio120910.php

The importance of making a good first impression in the classroom

Researchers examine how medical students evaluate professors

MAYWOOD, Ill. - A study of how medical students evaluate their professors is illustrating the critical importance of making a good first impression.

Students in a physiology course at Loyola University Chicago Stritch School of Medicine were asked to evaluate 16 professors who lectured during the course. Students had the option of evaluating each professor concurrently during the course, or waiting until the course ended. Students were allowed to change their minds before the evaluations were finalized at the end of the course.

The study, published in the December, 2010 issue of the journal Advances in Physiology Education, included 144 students. Twenty six percent filled out evaluations during the course and 65 percent waited until the course ended. Nine percent did not submit evaluations.

The scores professors received on early evaluations were markedly similar to the scores they received on evaluations made after the course ended. (In statistical terms, the correlation was .91.) And students rarely changed their minds about professors - only 3 percent of evaluations were revised before the evaluations were finalized.

"Students tended not to change their scores and comments, regardless of the time they submitted their evaluations," researchers wrote. "Hence, first impressions appear to be important."

For decades, students in colleges and graduate schools have been evaluating their professors. Faculty promotion and tenure decisions are based in part on these evaluations.

"The first lecture a faculty member gives to a class really sets the impression," said John A. McNulty, PhD, first author of the study. "The professor is either going to click with the student's learning style, or not."

At Loyola's Stritch School of Medicine, students are asked to rate how well professors communicate, relate course content to learning objectives and add to the student's understanding. Professors are rated on a scale of 1 to 5, with 1 the worst and 5 the best. Students also can write comments. In the most recent evaluations, the average score for basic science faculty was 4.2, and the average score for clinical faculty (physicians) was 4.38.

"We have a really good faculty," McNulty said. "The distribution of scores is skewed toward the high end."

McNulty is a professor in the Department of Cell and Molecular Physiology. Co-authors of the study are Dr. Gregory Gruener, professor in the Department of Neurology; Dr. Arcot Chandrasekhar, professor in the Department of Medicine; Dr. Baltazar Espiritu, associate professor in the Department of Medicine; Amy Hoyt, manager of information technologies for Loyola University Health System, and David Ensminger, clinical assistant professor in the School of Education at Loyola University Chicago.

http://www.eurekalert.org/pub_releases/2010-12/aafc-eai120110.php

Estrogen alone is effective for reducing breast cancer risk

SAN ANTONIO - *While endogenous estrogen (i.e., estrogen produced by ovaries and by other tissues) does have a well-known carcinogenic impact, hormone replacement therapy (HRT) utilizing estrogen alone (the exogenous estrogen) provides a protective effect in reducing breast cancer risk, according to study results presented at the 33rd Annual CTRC-AACR San Antonio Breast Cancer Symposium, held Dec. 8-12.*

"Our analysis suggests that, contrary to previous thinking, there is substantial value in bringing HRT with estrogen alone to the guidelines. The data show that for selected women it is not only safe, but potentially beneficial for breast cancer, as well as for many other aspects of women's health," said lead researcher Joseph Ragaz, M.D., medical oncologist and clinical professor in the faculty of medicine, School of Population and Public Health at The University of British Columbia, Vancouver, BC, Canada. "These findings should intensify new research into its role as a protective agent against breast cancer," he added.

Ragaz and colleagues reviewed and reanalyzed data from the Women's Health Initiative (WHI) hormone replacement therapy trials. WHI is a national health study that focuses on strategies for preventing heart disease, breast and colorectal cancer, and fracture in postmenopausal women. The WHI was launched in 1991 and includes more than 161,000 U.S. women aged 50 to 79 years.

"Over the last 30 years HRT has been used almost indiscriminately by women expecting the benefit of reducing cardiac risks, while providing a protective effect against bone fracture, and improving overall quality of life," said Ragaz. "The WHI results as originally interpreted led to a major pendulum swing against HRT."

The WHI HRT trial consisted of two cohorts of women; the estrogen-alone group of women without a uterus and the estrogen-plus-progestin group of women with a uterus.

Ragaz and colleagues reanalyzed the WHI studies in more detail and found that subsets of women with no strong family history of breast cancer who received estrogen alone had a significantly reduced breast cancer incidence. In addition, the 75 percent of women without benign disease prior to the trial enrollment also had a reduced breast cancer risk.

"Reduction of rates of breast cancer in the majority of women who are candidates for estrogen-based HRT is a new finding because estrogen was always linked with a higher incidence of breast cancer," Ragaz said, "yet estrogen administered exogenously is actually protective for most women."

Based on the results of this current analysis, Ragaz suggested that "while the use of HRT with estrogen alone may reduce the risk of breast cancer and may also be appropriate to manage menopausal symptoms, further research is warranted to elaborate on the optimum treatment regimen, to refine the selection of ideal candidates for estrogen therapy, and to understand the estrogen mechanisms that support the prevention of human breast cancer."

"The recommendations based on prior analyses of the results of the WHI HRT studies was not to use HRT, but we are optimistic this will change," he said. "Our conclusion, based on the data presented, should enhance

considerations for an early approval of HRT based on estrogen-alone for the majority of selected women suffering with menopausal symptoms and galvanize new research on HRT to define the optimum regimens for individual women."

http://www.eurekalert.org/pub_releases/2010-12/wuso-apc120710.php

Alzheimer's patients can't effectively clear sticky plaque component

Neurologists finally have an answer to one of the most important questions about Alzheimer's disease: Do rising brain levels of a plaque-forming substance mean patients are making more of it or that they can no longer clear it from their brains as effectively?

"Clearance is impaired in Alzheimer's disease," says Randall Bateman, MD, assistant professor of neurology at Washington University School of Medicine in St. Louis. "We compared a group of 12 patients with early Alzheimer's disease to 12 age-matched and cognitively normal subjects. Both groups produced amyloid-beta (a-beta) at the same average rate, but there's an average drop of about 30 percent in the clearance rates of the group with Alzheimer's." Scientists calculate this week in Science Express that it would take 10 years for this decrease in clearance to cause a build-up of a-beta equal to those seen in the brains of Alzheimer's patients.

The results have important implications for both diagnosis and treatment, according to the authors. Scientists are now interested in learning how a-beta, a byproduct of normal metabolism, is moved out of the brain for breakdown and disposal. As these details come in, they will be essential for physicians working to diagnose the disease before symptoms develop and for drug developers, who can target the problems with pharmaceuticals.

A-beta was recognized long ago as a key component of the brain plaques found during autopsies of Alzheimer's patients. One of the ways the brain clears away the a-beta normally produced by brain cell activity is by moving it to the spinal fluid for disposal. Studies have suggested that a drop in spinal fluid levels of a-beta may be a presymptomatic indicator of Alzheimer's disease, possibly because a-beta is getting stuck in the brain and starting to accumulate there.

Recent failures of therapies designed to clear a-beta from the brain have led some neurologists to speculate that a-beta may not be causatively linked to Alzheimer's. According to Bateman, though, the new data show that Alzheimer's is associated with disruption of the brain's ability to handle a-beta normally. "These findings support the idea that impaired a-beta clearance is fundamentally linked to Alzheimer's disease," Bateman says.

For the new study, scientists used stable isotope-linked kinetics (SILK), a process Bateman and his colleagues developed, to assess a-beta clearance and production rates. During SILK, researchers give test subjects an intravenous drip of the amino acid leucine that has been very slightly altered to label it.

Over the course of hours, cells in the brain pick up the labeled leucine and incorporate it into the new copies they make of a-beta and other proteins. Scientists take periodic samples of the subjects' cerebrospinal fluid through a lumbar catheter, purify the a-beta from the samples and determine how much of the a-beta includes labeled leucine.

Tracking the rise of a-beta with labeled leucine over time gives scientists the subject's a-beta production rate. When the percentage of a-beta containing labeled leucine plateaus, researchers stop introducing labeled leucine. Periodic sampling of the patients' CSF continues, allowing scientists to get a measurement of how quickly the nervous system clears out the labeled a-beta. Average clearance rate for a-beta differed significantly between the 12 normal subjects and the 12 with early Alzheimer's, but some normal subjects had lower clearance rates close to or slightly within the range seen in Alzheimer's patients.

"Cognitive tests show no signs of dementia in these participants now, but we'll be interested to see if a lower clearance rate is a predictive marker for future diagnosis of Alzheimer's disease," Bateman says.

Mawuenyega KG, Sigurdson W, Ovod V, Munsell L, Kasten T, Morris JC, Yarasheski KE, Bateman RJ. Decreased clearance of CNS amyloid-beta in Alzheimer's disease. Science Express, Dec. 9, 2010.

http://www.eurekalert.org/pub_releases/2010-12/bmj-ans120910.php

A new surgical tool - the IKEA pencil

The IKEA pencil: A surprising find in the NHS

IKEA pencils are better at marking out cuts in the bone for facial and head surgery than traditional felt tipped pens, say two surgeons in the Christmas issue published on bmj.com today.

Karen Eley, from the Nuffield Department of Surgical Sciences at the University of Oxford, and Stephen Watt-Smith, from the Department of Maxillofacial Surgery at the John Radcliffe Hospital in Oxford, say that while the popularity of the IKEA pencil is widely known - there is a Facebook page called “Ikea pencil stealing appreciation” – sourcing pencils from IKEA for surgery has surprised doctors.

They say “as popular as these little pencils are, we were still surprised to be handed one halfway through a surgical case … the use of a pencil to mark osteotomy cuts in craniofacial and maxillofacial surgery is well

established, proving superior to methylene, Bonney's blue and felt tipped skin markers that struggle to transfer an ink mark to bone, or are washed away by irrigation or tissue fluids".

Unfortunately, they say, repeated sterilisation means that some of the pencils split but even this problem has been overcome by wrapping silicon cuffs around the pencil.

Perhaps the designers at IKEA could act on this idea, suggest the authors.

http://www.bbc.co.uk/news/science-environment-11931039

Could starfish inspire new cure for inflammation?

By Rebecca Morelle Science reporter, BBC News

Lurking in the seas of Scotland is an unlikely candidate for a medical breakthrough.

But scientists believe the starfish could hold the key to finding a new treatment for inflammatory conditions such as asthma, hay fever and arthritis. The species they are interested in is the spiny starfish (Marthasterias glacialis), and in particular the slimy goo that covers its body. The team says that chemicals in this coating could inspire new medicines.

While most man-made structures that are placed in the water rapidly get caked with a mixture of marine life, starfish manage to keep their surface clear.

The spiny starfish can be found on the west coast of Scotland

Dr Charlie Bavington, from GlycoMar, a marine biotechnology company based at the Scottish Association for Marine Science in Oban, explained: "Starfish live in the sea, and are bathed in a solution of bacteria, larvae, viruses and all sorts of things that are looking for somewhere to live.

"But starfish are better than Teflon: they have a very efficient anti-fouling surface that prevents things from sticking." And it is this non-stick property that has grabbed medical scientists' attention, particularly in the field of inflammation.

Sticky problem

Inflammation is the body's natural response to an injury or infection, but inflammatory conditions are caused when the immune system begins to rage out of control. White blood cells, which normally flow easily through our blood vessels, begin to build up and stick to the blood vessel wall, and this can cause tissue damage.

The idea is that a treatment based on starfish slime could effectively coat our blood vessels in the same way the goo covers the marine creature, and prevent this problem.

Dr Bavington said: "It is a very similar situation to something sticking to a starfish in the sea.

"These cells have to stick from a flowing medium to a blood vessel wall, so we thought we could learn something from how starfish prevent this so we could find a way to prevent this in humans."

While many inflammatory conditions can be effectively treated, for example with steroids, these drugs can often cause unwanted side effects. But scientists at King's College London (KCL) think starfish could offer a better solution, and they have been analysing the chemicals in the creature's non-stick slime.

Clive Page, professor of pharmacology at KCL, said: "The starfish have effectively done a lot of the hard work for us. "Normally when you are trying to find a new drug to go after a particular target in human beings, you have to screen hundreds of molecules to find something that will give you a lead. "The starfish is effectively providing us with something that is giving is different leads: it has had billions of years in evolution to come up with molecules that do specific things."

Having identified promising compounds, the team is now working on creating their own versions of them in the laboratory. They want to create a treatment that is inspired by starfish goo rather than one that is made from it.

Professor Page said: "Conceptually we know this is the right approach. "It's not going to happen tomorrow afternoon, but we are learning all the time from nature about how to find new medicines."

Underwater pharmacy

While the starfish-based cure might be some years off, the race to explore the oceans for its medical potential is only just beginning. A sea snail has already formed the basis of a new painkiller, and scientists are starting to look at a whole range of marine life, from sea cucumbers to seaweed.

Dr David Hughes, an ecologist from the Scottish Association for Marine Science, explained: "Some of the most widespread, widely used medicines come from nature. "Penicillin is a mould that grows on bread, aspirin comes from willow trees, so it's not too surprising turning to nature to find useful drugs. But we've only very recently begun to look to the sea for a useful source of medicines."

And with the oceans covering nearly three quarters of the Earth's surface, scientists have likened the deep to an untapped underwater pharmacy.

Dr Hughes told the BBC: "There is such a huge diversity of animals and plants living in the oceans and very few of them have been tested and investigated in any way. "We know marine animals and plants produce a huge range of compounds, sometimes very different compounds from those produced by animals and plants on land. "So many might have useful properties that could be brought into medicine and other medicinal applications."

http://news.discovery.com/space/shine-on-zirconium-star.html

Shine On, Zirconium Star

By Jennifer Ouellette

Located some 2000 light years from the sun, just between the constellations Capricornus and Aquarius, this star's atmosphere features glittery clouds of zirconium - more commonly known as "fake diamond."

Other stars, like our Sun, might have trace amounts of zirconium - maybe one atom in two billion - but LS IV-14 116 has one zirconium atom for every 200,000 atoms. How does such a rare object form in the first place? Most ordinary stars with insufficient mass to go supernova when they die - about 97% of all the stars in the Milky Way - will puff up into a red giant once they deplete their hydrogen fuel and start fusing helium into carbon and oxygen.

If a red giant is big enough (has sufficient mass), once it runs out helium it will move on to fusing other elements. If it's not massive enough, the star "stalls out," as it were. All that carbon and oxygen - byproducts of the helium fusion process - build up in its core. At that point the star will shed its outer layers and the core will form a white dwarf. In rare cases, a star will shed its hydrogen layers prematurely during that first stage, before its core starts burning helium, and you end up with a helium-rich hot sub-dwarf, a progenitor to a white dwarf.

That's the class of star that Naslim and Jeffery were studying, hoping to ferret out clues as to why this category of star has so much less hydrogen on their surfaces than other similar stars.

They used spectroscopy for their analysis: a technique that breaks the light from celestial objects into a spectrum with telltale emission lines indicating which elements are present. (Each element has its own unique spectral pattern, like a chemical fingerprint.) That's how we know that hydrogen is the most abundant element in the universe, with helium close behind.

Naslim and Jefferey expected to see certain common elements, most notably hydrogen and helium, carbon, oxygen and the like. What they didn't expect: huge amounts of a form of zirconium that can only exist at temperatures above 20,000 degrees Celsius.

It's not a small excess either: there is 10,000 times more zirconium in LS IV-14 116 than in the sun. (There's also strontium, germanium and yttrium, between 1000 and 10,000 times more abundant than usual.) That translates to about 4 billion tons of zirconium here on Earth.

Those abundances were "a complete surprise," according to Naslim. That's why they titled their paper "An extremely peculiar hot sub-dwarf with a ten-thousand fold excess of zirconium, yttrium and strontium." They argue in their paper that all those extra elements comes from the formation of cloud layers in the star's atmosphere.

Yes, stars can have atmospheres; that's typically the only part of a star we can see directly. In general, the heavier atoms in the atmosphere sink and the light ones remain at the surface, which is why some white dwarfs, for example, have mostly pure hydrogen or helium atmospheres. Under the atmosphere, scientists think there is a very think crust of carbon and oxygen.

What's unusual about LS IV-14 116 is the high concentration of metals heavier than calcium in those cloud layers. In fact, theoretical models of that atmosphere indicate that there could be several very thin cloud layers, each comprised of a different metal. The star might even be shrinking as it cools, causing various elements to float into the atmosphere or sink to the bottom - with that glittery zirconium layer front and center. I'll bet LS IV-14 116 doesn't even care that it isn't made of real diamonds.

Some day, millions of years from now, LS IV-14 116 will cool off to the point where it becomes a bona fide white dwarf. Those are amazing objects in their own right, and also rather rare (perhaps because they're so difficult to spot): there's eight known white dwarfs in the hundred nearest star systems to our sun.

What makes a white dwarf so amazing is that it has no internal source of energy - its core material is done with fusion - to counter gravitational collapse. So gravity just smashes all those atoms together until the electrons literally have nowhere to go. At that point, the star is so dense, it becomes "degenerate." And quantum mechanics literally stops that gravitational crunch in its tracks.

Eventually, LS IV-14 116 will radiate away enough energy to cool down until it won't emit enough heat to be visible at all. That's known as a black dwarf, but since the process takes longer than the present age of the universe, there are no known black dwarfs in existence. Maybe LS IV-14 will be the first.

http://www.eurekalert.org/pub_releases/2010-12/usmc-ren121010.php

Researchers establish new rule to predict risk of stroke, death from surgery that prevents it

DALLAS – *It's a medical Catch-22: carotid artery surgery can itself cause stroke, but so can asymptomatic carotid disease if left untreated.*

UT Southwestern Medical Center researchers have now developed a clinical risk prediction rule using factors such as sex, race and health history to assess the danger the surgery poses, while a modified version will help patients make a more fully informed choice about whether to have the procedure.

"It may take a thief to catch a thief, but physicians don't want to cause stroke while trying to prevent stroke, so being able to carefully weigh an individual's benefits and risk from carotid surgery is critically important," said Dr. Ethan Halm, chief of the William T. and Gay Solomon Division of General Internal Medicine and senior author of the study published in the journal Stroke.

Researchers drew on factors that increase the risk for postsurgical death or stroke for people with silent, or asymptomatic, carotid disease to predict which patients were at highest risk for complications.

Those most at risk were female, non-white and had certain neurologic and heart diseases.

The carotid arteries, which run on the sides of the neck, are main blood vessels that supply oxygen to the brain. These arteries can become narrowed by fatty cholesterol deposits called plaque.

If pieces of plaque break free, they can lodge in the brain, causing stroke.

In carotid endarterectomy (CEA), one of the most common types of vascular surgery performed in the U.S., surgeons open the artery and remove the plaque. Silent, or symptom-free, carotid artery disease usually is found by chance during unrelated medical tests.

"Asymptomatic patients achieve only a modest benefit from surgery – their chance of stroke decreases from 2 percent annually to 1 percent annually – because they have a lower chance of having a stroke in the first place," Dr. Halm said.

"For patients with several other medical risk factors, the upfront risk of surgery can outweigh any potential long-term benefits."

To create a predictive model to help determine a patient's risk, Dr. Halm and colleagues reviewed cases from the New York Carotid Artery Surgery study (NYCAS). The NYCAS evaluated outcomes of carotid surgeries performed on elderly patients in 167 hospitals in New York state between January 1998 and June 1999.

Of the 9,308 surgeries, 6,553 were performed on asymptomatic patients. The average patient was 75 years old. Nearly 75 percent of patients had hypertension; 62 percent had coronary artery disease; and 29 percent had diabetes. Within 30 days of surgery, there were 55 deaths and 165 strokes.

The UT Southwestern researchers found that eight factors were independent predictors of death or stroke – being female, a minority, or severely disabled, or having a history of stroke, having arteries narrowed more than 50 percent, coronary artery disease, congestive heart failure or valvular heart disease.

They assigned each risk factor one point, except for disability which counts as 2. Patients with a score of 0 to 2 are low risk; those with 3 points are at moderate risk; more than 4 are high risk. Using this CEA-8 rule, they determined that one-fourth of the NYCAS patients had a higher probability of death and stroke than the recommended national guidelines.

They then created the CEA-7, a patient-friendly model, that eliminates non-operative stenosis. Patients can also determine their own risk, even if they don't know whether their arteries are more than 50 percent blocked.

"These models are the first for asymptomatic patients and are a practical and easy-to-use tool for doctors and patients to evaluate what is best for them in the long term," Dr. Halm said.

"These aren't the only factors a patient should consider – individual health and experience of the surgeon and hospital team count, too – but hopefully with these models, patients and doctors can more accurately individualize the risk of complications."

The authors are now developing an interactive educational program that helps patients better understand the different risks and benefits of surgical versus medical management of asymptomatic carotid disease.

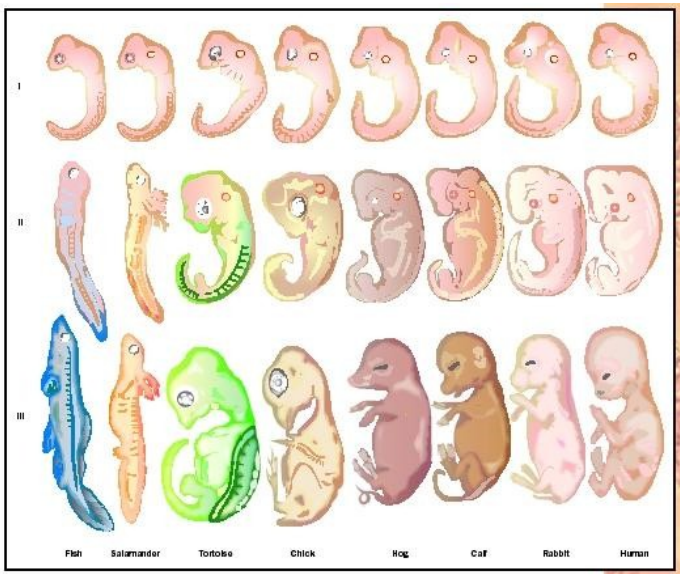
Other UT Southwestern researchers participating in the study were Dr. Linda Calvillo King, assistant professor of internal medicine; Lei Xuan, biostatistical consultant in clinical sciences; and Dr. Song Zhang, assistant professor of clinical sciences. Researchers from Mount Sinai School of Medicine also participated.

The study was funded by the National Institute of Neurological Disorders and Stroke, Agency for Healthcare Research and Quality, Centers for Medicare & Medicaid Services, and the Robert Wood Johnson Foundation.

http://www.physorg.com/news/2010-12-scientists-insight-year-old-riddle.html

Scientists give insight into 200-year-old riddle

(PhysOrg.com) - *University of Manchester researchers have played a vital role in an international study that has revived the 200-year-old question: why do different species share similar stages of embryonic development?*



Dr Casey Bergman and Dr Dave Gerrard at Manchester's Faculty of Life Sciences collaborated on the project with Pavel Tomancak, at the Max Planck Institute of Molecular Cell Biology and Genetics in Dresden, and Uwe Ohler, at Duke University, on a study funded by the Human Frontiers of Science Program published in Nature today.

The team looked at differences in the embryonic development of species in search of what unites animal groups at the level of embryos and their genes, bringing the power of modern molecular techniques to bear on what is a classic problem in biology.

It has long been noted that there are striking similarities between the embryonic development of animals and their evolutionary histories. This relationship between how animals develop and deep evolutionary time hints at the existence of profound connections between different animal species and has therefore captured the imagination of both biologists and the wider public.

However, ever since the first observations were discussed by leading 19th century biologists, such as von Baer, Darwin, and Haeckel, the existence and meaning of these similarities has been fraught with controversy arising from the subjective nature of the comparisons of different animal forms.

While the pioneers of embryology believed that animal species are most similar at the earliest stages of their embryonic development, the arrival of improved observational methods in the 20th century led to a revised proposal.

It was noticed that the middle periods of embryonic development exhibit the highest similarity between species belonging to the same broad taxonomic group, known as a 'phylum', with earlier and later periods often showing remarkable divergence in form. This so-called 'hourglass model,' has so far been supported by the same types of evidence available to 19th century biologists, namely subjective comparisons of embryo appearance.

Taking advantage of advancements in large-scale gene-based methods, the international team compared the embryonic development of six different fruit fly species at the molecular level. Instead of subjective assessment of a handful of visible traits, they made objective measurements of expression levels for several thousand genes.

The team found that the developmental period when insects are most similar in form is indeed underpinned by a corresponding similarity in gene expression. "This discovery both confirms the conclusions of previous anatomical studies and extends our understanding of the relationship between development and evolution to the molecular level," explained Dr Kalinka, who led the analysis of the data.

The team also shed light on the reason why there is a period of similarity in the middle of animal embryonic development, a fundamental problem that has so far remained unanswered. Dr Bergman explained: "Our study provides the first solid evidence that this period of similarity between animal species is being actively preserved by natural selection as opposed to being a period that is simply resistant to change for other reasons."

The results open up new horizons, as the fruit-fly species used are one of the best-studied experimental model systems for genetics, development and evolution.

Detecting the hourglass pattern among such closely related species is for biologists equivalent to obtaining a time machine into processes that led to the initial branching on the animal tree 600 million years ago, as these species are very much alive today and can be probed and studied by modern technologies such as genome manipulation and high-resolution imaging.

Pavel Tomancak, who led the study, concludes: "In the future we hope to use these new tools to gain deeper insight into the evolutionary processes that shaped the remarkable diversity of animal forms observed today."

More information: The paper 'Gene expression divergence recapitulates the developmental hourglass model' (Nature, December 9, 2010) is available at http://www.nature. ... re09634.html Provided by University of Manchester (news : web)

http://www.newscientist.com/article/mg20827903.500-fungus-out-the-frog-resistance-is-here.html

Fungus out! The frog resistance is here

*** 10 December 2010 by Wendy Zukerman**

FROGS across Australia and the US may be recovering from a fungal disease that has devastated populations around the world.

"It's happening across a number of species," says Michael Mahony at the University of Newcastle in New South Wales, who completed a 20-year study of frogs along the Great Dividing Range in Australia for the Earthwatch Institute. Between 1990 and 1998 the populations of several frog species crashed due to chytridiomycosis infection (chytrid) caused by the pathogen Batrachochytrium dendrobatidis, but Mahony's surveys suggest that the frogs are re-establishing.

Barred river frogs (Mixophyes esiteratus) disappeared, he says, but now up to 30 of the animals have returned to streams across Australia's Central Coast. The tusked-frog (Adelotus) and several tree frog species (Litoria) have also returned there. Ross Alford at James Cook University in Townsville, Queensland, says tree frogs are also repopulating other areas of the state after their numbers nosedived. Some have even reached pre-infection levels.

In the US there are also signs of recovery. Roland Knapp at Sierra Nevada Aquatic Research Laboratory at the University of California says mountain yellow-legged frogs (Rana muscosas) - once "driven virtually to extinction" - are returning. The big question is: are frogs now beating chytrid?

Using electronic tagging to track frogs, Knapp (Proceedings of the National Academy of Sciences, DOI: 10.1073/pnas.0912886107) and Mahony have separately found that recovering frogs are living with low-level infections of the fungus.

It is possible, they say, that the fungus has weakened in recovering areas. Knapp says there is evidence that the frogs are evolving. Initial findings from his team show that frogs from recovered populations can survive when challenged with a fungal strain, unlike frogs with no previous exposure to the fungus, which died after it colonised their skin.

At Vanderbilt University Medical Centre, Nashville, Alford and Louise Rollins-Smith found that a population of Australian green-eyed tree frogs previously decimated by the fungus produced more anti-microbial peptides - which inhibit fungal growth - on their skin than a less affected population (Diversity and Distribution, vol 16, p 703). "It's quite likely that populations are adapting and developing better defences," says Rollins-Smith.

Worldwide, most amphibian communities are not recovering, though earlier this year Ursina Tobler at the University of Zurich, Switzerland, showed for the first time that even in devastated populations, some tadpoles can survive infection (PLoS One, DOI: 10.1371/journal.pone.0010927).

http://www.physorg.com/news/2010-12-statin-linked-rare-autoimmune-muscle.html

Study finds statin use linked to rare autoimmune muscle disease

Johns Hopkins researchers have discovered how statins, the most commonly prescribed class of medication in the United States, appear to trigger a rare but serious autoimmune muscle disease in a small portion of the 30 million Americans who take the cholesterol-lowering drugs.

Johns Hopkins researchers have discovered how statins, the most commonly prescribed class of medication in the United States, appear to trigger a rare but serious autoimmune muscle disease in a small portion of the 30 million Americans who take the cholesterol-lowering drugs.

Taking statins, they found, can sometimes cause the body to produce antibodies against its own proteins, creating a condition that gets progressively worse - not better - even after the medication is discontinued. As the painful and debilitating disorder is uncommon and can be treated with steroids and other immune-suppressing drugs, the Hopkins researchers caution that people who must be on statins to reduce serious risk of heart disease and stroke should not avoid the drugs.

“We have long known that there must be environmental triggers to the development of autoimmune disorders,” says Andrew L. Mammen, M.D., Ph.D., an assistant professor of neurology and medicine at the Johns Hopkins University School of Medicine. “Now we have evidence that this medication is just such a trigger and, under certain circumstances, provokes a sustained autoimmune disease.”

Beyond the “proof of principle” in Mammen’s findings, published online in the journal Arthritis & Rheumatism, they could also lead to lab tests that identify early autoimmune muscle disease, guide treatment before symptoms escalate and, possibly, predict who is at risk before statins are prescribed.

Mammen cautions that the Hopkins research describes a rare side effect, noting that statins are a “fantastic medication” that have proven value. “No one who needs statins should be afraid to take them because of the slim risk of developing this autoimmune disease,” he says.

"Statins save a huge number of lives. They dramatically reduce the risk of strokes and heart attacks," Mammen adds. "The ultimate goal of our research is to determine before patients start taking statins who might be sensitive to the medication and who might be susceptible to its potentially toxic effects on the muscle. We want to prevent this autoimmune disease."

Although statins are tolerated by most patients, about 5 percent who take them experience muscle pain and/or weakness severe enough to warrant stopping the medication. Most of those people will make a full recovery once they are off the drug, but there appears to be a group who will develop this progressive autoimmune muscle disease. They get weaker even after the medication is stopped, some end up in wheelchairs and at least one has died. Immunosuppressive therapy with steroids or other drugs are effective in reversing the disease in most patients, Mammen says.

In his initial research, Mammen and his colleagues focused on 26 patients at the Johns Hopkins Myositis Center with necrotizing myopathy, a muscle-wasting disorder with no known cause. Sixteen were found to have a previously unknown antibody. Of the 16 patients with this novel antibody, 12 were over the age of 50 and, of those, more than 80 percent had taken statins before their muscle pain and weakness began. The frequency of statin use in patients with similar muscle diseases is significantly lower. In his latest research, Mammen identified the target of the antibodies as HMG-CoA reductase, or HMGCR. HMGCR is the enzyme responsible for making cholesterol - and it is the same enzyme that statins target.

In their collection of over 750 patients with muscle symptoms, 45 patients with HMGCR antibodies were identified. Of those over 50 years of age, greater than 90 percent had a prior statin exposure. The younger patients, he says, had not been on statins, and how the disease is triggered has not been determined. However, Mammen suspects that they may suffer from other cholesterol issues, a factor that could play a role in the development of the disease.

Antibodies are typically made by healthy people to recognize and destroy foreign invaders. But in patients with autoimmune diseases, the body makes auto-antibodies - antibodies that attack the body's own proteins. In the case of statin-associated autoimmune muscle disease, the body attacks its own HMGCR. When a patient takes statins, HMGCR levels rise as the body tries to compensate for the reduction in the enzyme caused by the medication. Mammen hypothesizes that the extra HMGCR in the body may sometimes stimulate the immune system to make autoantibodies.

Compounding the problem is the finding that while normal muscle tissue makes low levels of HMGCR, regenerating muscle cells make very high levels of HMGCR. This suggests that once the autoimmune muscle disease process is initiated by statin use, high levels of HMGCR in regenerating muscle cells continue to fuel the aggressive and painful autoimmune response, even after statins are withdrawn.

Although doctors don't yet know how many people have statin-associated autoimmune muscle disease, Mammen and his colleagues believe it is rare. Even in the Myositis Center, just four percent of patients have been diagnosed with it. Mammen says the lab test he and his team have developed, which has not yet been approved by regulators, enables them to diagnose the disease with near certainty.

Some of his patients, however, continue to need the very medication that caused their pain.

"One of the questions that remain is: Can you safely restart statins? It's important because some of our patients were put on statins for very good reasons, like they've had a heart attack," Mammen says. "We would like to find out if there is a way for these patients to begin taking the medication again."

Provided by Johns Hopkins University

http://seattletimes.nwsource.com/html/businesstechnology/2013635844_apusfaalasers.html

Laser incidents on rise; aviation officials worried

By JOAN LOWY Associated Press

Federal Aviation Administration officials are worried about a substantial increase in the number of people pointing lasers at aircraft cockpits, saying the intense light can distract and temporarily blind pilots and has caused some to relinquish control to their co-pilots or abort landings.

This year, there have been more than 2,200 incidents reported to the Federal Aviation Administration, up from fewer than 300 in 2005. California, Texas and Florida have recorded the most, but the problem is widespread across the country. There hasn't been an air crash so far, but the incidents have aviation officials concerned.

"It sounds silly, but this is a serious problem," FAA Administrator Randy Babbitt wrote Wednesday in a post on a Transportation Department blog. "We know that laser pointers are an important tool for astronomers and casual stargazers," Babbitt wrote. "But we just can't stress enough the importance of being careful when you are shining them into the night sky."

The rise in incidents has coincided with a growing hobbyist market for handheld lasers that are far more powerful - and potentially dangerous - than the typical laser pointer. At the same time prices have dropped. Lasers that once cost more than $1,000 can now be bought online for a few hundred dollars or less.

Some lasers are marketed with holsters that can be clipped onto a belt, creating a gunslinger-like appearance. Earlier this year, Lucasfilm threatened legal action against Wicked Lasers, a Hong Kong-based company whose lasers have aluminum handles that resemble the lightsabers of the "Star Wars" movies. Lucasfilm later dropped the threat. "Wicked Lasers defeats dark forces of George Lucas," the laser company's website brags.

The American Academy of Ophthalmology issued a statement in September warning parents that new, powerful laser devices can easily cause eye damage and blindness. The academy pointed to the case of a 15-year-old boy who suffered severe eye damage while playing with a laser in front of a mirror. Lasers don't have to be pointed at someone's eyes to cause harm; reflected light can cause damage as well.

A laser pointer like those used by lecturers typically generates about 5 milliwatts of power. Wicked Laser's website offers a 1,000-milliwatt handheld laser.

The laser company didn't respond to an e-mail request for comment.

Dozens of people in the United States and around the world have been arrested for pointing lasers at aircraft cockpits, most often near airports during takeoffs and landings. Those are the most critical phases of flight, when pilots need to be their most alert. Interference with air navigation is a federal crime.

Last year, an Orange, Calif., man was sentenced to 2 1/2 years in prison for aiming a handheld laser at two Boeing jets as the passenger planes were about to land at John Wayne Airport.

In August, a Baltimore police helicopter pilot was temporarily "flash blinded" by a laser, preventing him from helping fellow officers chasing a suspect. The pilot recovered, circled around and spotlighted the house where the beam had come from as officers on the ground rushed in to arrest the culprit.

The same month, green lasers were pointed at the cockpits of two medical helicopters transporting patients in Pittsburgh, including a 5-year-old boy injured in a bicycle accident.

There are red, blue and violet lasers as well, but the green is the most visible against a night sky. The green lasers are also 35 times brighter than equivalently powered red lasers because humans are much more sensitive to green light, according to the Congressional Research Service.

In July, a Maryland state police helicopter pilot was briefly blinded by several green lasers while trying to land in Ocean City to pick up a trauma patient, but no one was injured. Two Coast Guard helicopters made precautionary landings this summer after the pilots were flashed with lasers while patrolling Los Angeles beaches and ports.

Last year, pilots of dozens of planes taking off and landing at Seattle-Tacoma International Airport reported being flashed with green lasers. *Online: http://www.faa.gov*

http://www.newscientist.com/article/dn19854-haitian-cholera-strain-could-dominate-the-americas.html

Haitian cholera strain could dominate the Americas

*** 16:12 10 December 2010 by Debora MacKenzie**

The DNA of the cholera bacteria ravaging Haiti has been sequenced, and the news is not good. It is carrying a mutation that seems to cause more intense disease.

This has already helped the strain to dominate in south Asia, and the Haitian epidemic could spread it still further.

The US Centers for Disease Control and Prevention (CDC) reported on 8 December that in its first six weeks, the Haitian cholera has been 11.5 times as likely to kill its victims as the cholera that reached Peru in 1991, even though Peruvians, like Haitians, had no prior immunity to the bacteria.

The death rate could partly be because medical care, nutrition and HIV levels are worse in earthquake- and poverty-stricken Haiti than Peru, says Matt Waldor of Brigham and Women's Hospital in Boston. But it could also be due to a nastier cholera toxin.

Single source

Waldor and colleagues have now sequenced the full DNA of the Haitian cholera and compared it with cholera from Peru, Bangladesh, the Gulf of Mexico and elsewhere. The analysis, done in record time using a new sequencing technique, confirmed a simpler analysis by the CDC last month, showing the Haitian bacteria were from a single source and similar to recent south Asian strains.

The greater genetic detail showed that the Haitian bacteria are "nearly identical" to the predominant south Asian strain, but a different lineage to cholera in South America, or strains occurring naturally in the Gulf of Mexico. "The bottom line is, this cholera was introduced by human activity from thousands of miles away," says Waldor.

Two mutations in both south Asian and Haitian bacteria mean they make the "classical" toxin seen in pandemics before the 1960s. The classical toxin is thought to cause worse disease than the toxin from the cholera strain that has been spreading around the world since 1961.

The Haitian toxin also carries a third mutation that appeared in 2002 in Bangladesh, and was until very recently found only in south Asia. The 2002 mutation has allowed the bacteria to almost totally replace the previous strain in south Asia, says Stephen Calderwood of the Massachusetts General Hospital in Boston, co-author of the sequencing report.

In the same way, the Haitian cholera could displace strains that have circulated in South America since 1991 if it gets loose there, Calderwood says. The bacteria exchange genes promiscuously, so new hybrids, with unpredictable properties, could also arise.

Tough and intense

This is bad news, as the Haitian strain carries more antibiotic-resistance genes than South American cholera. Its mutant toxin also seems to cause more intense diarrhoea – which is how cholera kills. The CDC says people have died a mere 2 hours after first getting symptoms.

Meanwhile, with predictions of eventual case numbers climbing from 400,000 to 650,000 in just one week, there seems no end in sight for Haiti's epidemic. Aid workers have already carried cholera abroad, though no secondary epidemics have yet been spawned.

Waldor and his colleagues are calling for vaccination and better sanitation in Haiti, to "minimise the spread of the new south Asian strain, and the virulence genes it carries, beyond the shores of this Caribbean island".

Journal reference: New England Journal of Medicine, in press

http://news.nationalgeographic.com/news/2010/12/101210-stonehenge-balls-ball-bearings-science-rolled/

Stonehenge Built With Balls?

New experiment suggests monumental stones could have rolled on rails.

It's one of Stonehenge's greatest mysteries: How did Stone Age Britons move 45-ton slabs across dozens of miles to create the 4,500-year-old stone circle?
Now a new theory says that, while the ancient builders didn't have wheels, they may well have had balls.

A previous theory suggested that the builders used wooden rollers - carved tree trunks laid side by side on a constructed hard surface. Another imagined huge wooden sleds atop greased wooden rails.

But critics say the rollers' hard pathway would have left telltale gouges in the landscape, which have never been found. And the sled system, while plausible, would have required huge amounts of manpower - hundreds of men at a time to move one of the largest Stonehenge stones, according to a 1997 study.

U.K. archaeology students attempt to prove a rail-and-ball system could have moved Stonehenge stones. Kate Ravilious in York, U.K. for National Geographic News

Andrew Young, though, says Stonehenge's slabs, may have been rolled over a series of balls lined up in grooved rails, according to a November 30 statement from Exeter University in the U.K., where Young is a doctoral student in biosciences.

Young first came up with the ball bearings idea when he noticed that carved stone balls were often found near Neolithic stone circles in Aberdeenshire, Scotland ***(map)***.

"I measured and weighed a number of these stone balls and realized that they are all precisely the same size - around 70 millimeters [3 inches] in diameter - which made me think they must have been made to be used in unison, rather than alone," he told National Geographic News.

The balls, Young admitted, have been found near stone circles only in Aberdeenshire and the Orkney Islands (***map***) - not on Stonehenge's Salisbury Plain.

But, he speculated, at southern sites, including Stonehenge (***map***), builders may have preferred wooden balls, which would have rotted away long ago. For one thing, wooden balls are much faster to carve. For another, they're much lighter to transport.

Proof of Concept

To test his theory, Young first made a small-scale model of the ball-and-rail setup.

"I discovered I could push over a hundred kilograms [220 pounds] of concrete using just one finger," he said.

With the help of his supervisor, Bruce Bradley, and partial funding from the PBS series Nova, Young recently scaled up his experiment to see if the ball-and-track system could be used to move a Stonehenge-weight stone. Sure enough, they found that, with just seven people pushing, they could easily move a four-ton load - about as heavy as Stonehenge's smaller stones.

Using the ball system, Young said, "I estimate it would be possible to cover 20 miles [32 kilometers] in a day" by leapfrogging track segments.

But the inner circle's "sarsen" stones weigh not 4 tons but up to about 45 tons. Young suspects a Stone Age system could have handled much heavier loads than his experimental one.

For one thing, he thinks oxen, not people, provided the pulling power - an idea supported by the remains of burned ox bones found in ditches around many stone circles.

For another, Britain's old-growth forests hadn't yet been razed 4,500 years ago, so the builders would have had easy access to cured oak. This tough wood - which was beyond the modern project's budget - would have resulted in a stronger, more resilient system than the soft, "greenwood" system the researchers built.

Stonehenge Experiment Needs Scaling Up

Civil engineer Mark Whitby, who's been involved with other Stonehenge-construction experiments, thinks the ball method could work for smaller stones but isn't convinced it could shift a sarsen.

"The problem will be when the tip of the ball bears on the timber trough, it will bite" into the trough, possibly splitting the rail, said Whitby, who runs London-based +Whitby Structural Engineers. "When transporting lighter stones, this won't be a problem. But when they get to 30 and 40 tons, it will be."

Instead, Whitby prefers the sled theory - and even helped prove a sled could move a 40-ton replica sarsen for a 1997 BBC documentary.

Archaeologist David Batchelor, meanwhile, thinks the ball idea is plausible but isn't completely convinced.

The ball technique "seems to be a development of the sledge method," said Batchelor, of the government agency English Heritage. "But the added complexity needed to channel the track runners and then make the ball bearings all of one size seems to me a lot of work, which is probably unnecessary when animal-fat grease does the job."

Research leader Young counters that the sled system, even with its animal-fat lubrication, still results in a lot of friction. "Using wooden balls almost removes friction from the system and makes for a really efficient method of moving heavy weights around," he said.

Even so, Young realizes he needs to prove the new system can be scaled up to handle heavier loads. To that end, Young's team is seeking funding to repeat the experiment - this time with harder wood, stone balls, and oxen.

http://www.physorg.com/news/2010-12-big-gains-hospitalized-seniors.html

A few steps could lead to big gains for hospitalized seniors

"You'll be back on your feet in no time" is a phrase familiar to anyone who's ever had to spend time in a hospital. Now, a new study has shown that hospitalized elderly patients who literally "get back on their feet" by taking even short walks around a hospital unit tend to leave the hospital sooner than their more sedentary peers.

Conducted at the University of Texas Medical Branch at Galveston and described in a paper appearing in the current issue of Archives of Internal Medicine, the study draws on data collected from 162 hospitalized patients over age 65. Each patient was fitted with a pager-sized "step activity monitor" attached to his or her ankle - an electronic device capable of counting every step the patient took.

"Using these monitors, we were able to see a correlation between even relatively small amounts of increased mobility and shorter lengths of stay in the hospital," said Steve Fisher, a UTMB Health assistant professor and lead author on the paper. "We still found this effect after we used a statistical model to adjust for the differing severities of the patients' illnesses."

Clinicians have long recognized the importance of getting patients with orthopedic or neurologic conditions up and walking as soon as possible, but no such "standard of care" currently exists for older adults admitted for acute medical illnesses. According to the authors of the UTMB Health study, their work could serve as a first step toward that goal - and may also open the door to other improvements in hospital care for the elderly.

"Mobility is a key measure in older people's independence and quality of life generally, and this study suggests that's also true in the hospital setting," said Fisher. "When we hospitalize elderly people, we set up a paradoxical situation: you can have a positive outcome of the acute problem that brought them there, but still have negative consequences as a result of extended immobility."

Mobility in the hospital as measured by an activity monitor could potentially become a kind of vital sign for the elderly, Fisher said, as well as a tool that would help researchers find the minimal levels of activity necessary to protect elderly patients from long-term declines in function.

"This is very preliminary, but it's leading to a lot of questions right now that I think need to be answered," said UTMB Health professor Glenn Ostir, a co-author on the paper and director of research for the university's Acute Care for Elders unit. "We know from other research that mobility is linked to older people's quality of life, independence, maintenance of healthy muscle mass, all these things. And so we need to look at this and say what is the impact of mobility in the hospital on the overall health of the older person once they leave the hospital - do they rebound and do better, or do they wind up in a downward spiral that leads to increased re-hospitalization? The step monitors have given us the technology to potentially do this, and we're excited about the chance to answer these questions and make a positive difference in people's lives."

Provided by University of Texas Medical Branch at Galveston

http://www.physorg.com/news/2010-12-circulating-tumor-cells-recurrence-death.html

Circulating tumor cells predicted recurrence, death in patients with early-stage breast cancer

The presence of one to four circulating tumor cells (CTCs) in the blood of early-stage breast cancer patients almost doubled patient's risk of cancer relapse and death, and five or more CTCs increased recurrence by 400 percent and death by 300 percent, according to Phase III results of the SUCCESS trial.

These cells were found in patients after surgery but before chemotherapy treatment.

Results of this study were presented at the 33rd Annual CTRC-AACR San Antonio Breast Cancer Symposium, held Dec. 8-12, 2010, and demonstrate the value of CTCs in early breast cancer, independent of estrogen-receptor or HER2 status and before use of adjuvant therapy.

The benefit of using CTCs to predict risk for recurrence and death in metastatic breast cancer patients has been shown in a number of studies, and use of a CTC test in metastatic breast cancer has been approved by the Food and Drug Administration.

The CTCs found in this study are likely evidence that a tumor is shedding breast cancer cells, said lead researcher Brigitte Rack, M.D., head of the department of gynecological oncology at the Women's Hospital at the University of Munich, Germany. "The CTCs might have been released from the primary tumor before these patients underwent surgery, and the expression of stem cell markers on disseminated tumors cells has been shown by several groups."

Survival of these CTCs after chemotherapy further suggests they are cancer stem cells, Rack added.

Researchers with this study are testing the effectiveness of two different chemotherapy regimens and extended adjuvant bisphosphonate treatment in early breast cancer. SUCCESS' efficacy data are expected to be released next year.

Results of this study showed that 21.5 percent of patients had one or more CTC in their blood before the start of adjuvant treatment. These patients were more frequently node-positive, but no other linkage could be made with tumor size or grade or HER2 status.

Breast cancer recurred in 114 patients, and 66 patients died. Being CTC-positive was a significant independent predictor for both disease-free and overall survival. Patients with one to four CTCs had an 88 percent increased risk of early breast cancer recurrence and a 91 percent increased risk of death from breast cancer, according to Rack.

Prognosis was worse in patients with five or more CTCs; these patients had a fourfold risk of cancer recurrence and a threefold risk for death from the disease.

"Our study suggests testing CTCs may prove to be important to help individualize therapy for early-stage breast cancer where no measurable tumor is present," she said. "Patients who seem to be at high risk due to CTC may benefit from additional treatment options, and those that don't have CTCs may be spared side effects of some treatments."

She added, however, that prospectively randomized trials are necessary to show an improvement of survival based on CTC diagnostics. Trials testing this notion are either ongoing or about to start in Europe and the United States, according to Rack. *Provided by American Association for Cancer Research*

http://www.scientificamerican.com/podcast/episode.cfm?id=what-makes-an-honest-smile-honest-10-12-11

What Makes An Honest Smile Honest?

What is the telltale clue to a genuine smile?

Recent research finds positive correlations with this honest show of emotion. Christie Nicholson reports

Most of us can spot a genuine smile. There’s just something different about it.

Well it was a French doctor in the 1860s who went to the trouble of stimulating facial muscles with electrical currents to discover just what reveals a genuine smile. It's two muscles working together. The zygomatic major muscle that turns the corners of the lips up, and the orbicularis oculi muscle that squeezes the eyes into the famous fanned wrinkles also known as crows feet. Now it's this latter muscle that's involuntary, so the crows feet smile is considered the real spontaneous emotion and is known as the Duchenne smile.

It turns out the real thing has a lot of power. In this month's Observer Magazine, Eric Jaffe outlines some fascinating effects of an honest smile. For instance a 30-year long study published in the Journal of Personality and Social Psychology found that women who displayed the Duchenne smile in their college yearbook photos had greater levels of well-being and marital satisfaction three decades later. Another study published this year in Psychological Science went further, and found that professional baseball players who sported Duchenne smiles in their yearbook photo were only half as likely to die as those who had not.

So during this holiday season, when the cameras and cell phones come out, give it your best, most candid smile…it appears a good thing.

http://www.eurekalert.org/pub_releases/2010-12/asfc-usm112410.php

Ubiquitous sugar molecule could be key to repairing deep wound without scarring

Findings presented at American Society for Cell Biology's 50th annual meeting in Philadelphia

Blocking fragments of the sugar molecule hyaluronan that triggers inflammation could be the key to robust healing and less scarring in deep wounds, Canadian researchers reported at the American Society for Cell Biology's 50th Annual Meeting in Philadelphia.

In laboratory rats, the small peptide, named 15-1, which blocks fragments of the ubiquitous sugar molecule, hyaluronan, promoted wound healing, minimized scarring and forged stronger new tissue. These effects did not occur in the untreated animals in the study, according to Cornelia Tölg, Ph.D., of the London (Ontario) Regional Cancer Program.

With collaborators in Canada and the U.S., Tölg identified peptide 15-1 for its ability to cap molecular receptors in epithelial and dermal cells that react to fragments of the hyaluronan molecule by setting off a cellular pathway linked to inflammation.

A single dose of peptide 15-1 reduced wound contraction, collagen deposits, inflammation and growth of unwanted new blood vessels in lab animals. The researchers said that these findings may have clinical implications for human wound healing.

A major component in skin, hyaluronan has been known to play a complicated although unclear role in closing deep wounds and minimizing fibrotic scarring in repaired tissue.

Until the late 1970s, hyaluronan was considered to be little more than the inert "goo" that filled the extracellular matrix, but has since emerged as a biological star in a wide range of biological processes, from embryonic heart development to tumor metastasis to wound repair.

The relationship between hyaluronan levels and tissue regeneration is paradoxical according to Tölg. Hyaluronan levels are extremely high in developing embryos and newborns, which can recover readily from surgery without scarring. But throughout adult life, levels of intact hyaluronan drop while the proportion of broken hyaluronan molecules increases.

Thus, while the intact hyaluronan molecule promotes strong healing, hyaluronan fragments engage the receptor for hyaluronan-mediated motility (RHAMM), setting off inflammation that can result in fibrotic scarring and weak granulated tissue.

Tölg and colleagues used microscopic beads coated with hyaluronan to pinpoint two small peptides that bound to the shape of the molecule. One of them, peptide 15-1, showed an affinity for fastening itself to hyaluronan fragments, effectively keeping them from the RHAMM.

Co-Authors: *C. Tölg, E. Turley, London Regional Program, London, Ontario, CANADA*
R. Savani, Southwestern Medical Center, Dallas, TX D. Bagli, Hospital for Sick Children, Toronto, Ontario, CANADA
F. Winnik, Université de Montreal, Montreal, Quebec, CANADA M. Cowman, Polytechnic Institute of New York University, New York, NY

http://www.eurekalert.org/pub_releases/2010-12/uoc--usi121010.php

UCR scientists identify pomegranate juice components that could stop cancer from spreading

Research could lead to new drug therapies to fight cancer

RIVERSIDE, Calif. – Researchers at the University of California, Riverside have identified components in pomegranate juice that both inhibit the movement of cancer cells and weaken their attraction to a chemical signal that promotes the metastasis of prostate cancer to the bone. The research could lead to new therapies for preventing cancer metastasis.

Performed in the lab of Manuela Martins-Green, a professor of cell biology, the research was presented today (Dec. 12, 2010) at the 50th annual meeting of the American Society for Cell Biology taking place in Philadelphia.

Prostate cancer is the second-leading cause of cancer-related deaths in men in the United States. To date, there is no cure for it. If prostate cancer recurs after treatments of surgery and/or radiation, usually the next treatment is the suppression of the male hormone testosterone, which inhibits the growth of the cancer cells because they need this hormone to grow. But over time, the cancer develops ways to resist hormone suppression therapies, becomes very aggressive, and metastasizes to the bone marrow, lungs, and lymph nodes, usually resulting in the patient's death.

The Martins-Green lab applied pomegranate juice on laboratory-cultured prostate cancer cells that were resistant to testosterone (the more resistant a cancer cell is to testosterone, the more prone it is to metastasizing).

The researchers – Martins-Green, graduate student Lei Wang and undergraduate students Andre Alcon and Jeffrey Ho – found that the pomegranate juice-treated tumor cells that had not died with the treatment showed increased cell adhesion (meaning fewer cells breaking away) and decreased cell migration.

Next, the researchers identified the following active groups of ingredients in pomegranate juice that had a molecular impact on cell adhesion and migration in metastatic prostate cancer cells: phenylpropanoids, hydrobenzoic acids, flavones and conjugated fatty acids.

"Having identified them, we can now modify cancer-inhibiting components in pomegranate juice to improve their functions and make them more effective in preventing prostate cancer metastasis, leading to more effective drug therapies," Martins-Green said. "Because the genes and proteins involved in the movement of prostate cancer cells are essentially the same as those involved in the movement of other types of cancer cells, the same modified components of the juice could have a much broader impact in cancer treatment."

Martins-Green explained that an important protein produced in the bone marrow causes the cancer cells to move to the bone where they can then form new tumors.

"We show that pomegranate juice markedly inhibits the function of this protein, and thus this juice has the potential of preventing metastasis of the prostate cancer cells to the bone," Martins-Green said.

Next, her lab plans to do additional tests in an in vivo model for prostate cancer metastasis to determine whether the same cancer-inhibiting components that work in cultured cells can prevent metastasis without side effects.

http://www.eurekalert.org/pub_releases/2010-12/gumc-yo120310.php

'Grow your own transplant' may be possible for men with type 1 diabetes

Researchers turn human testes cells into insulin-producing islet cells; diabetic mice were 'cured' for a week

PHILADELPHIA – Men with type 1 diabetes may be able to grow their own insulin-producing cells from their testicular tissue, say Georgetown University Medical Center (GUMC) researchers who presented their findings today at the American Society of Cell Biology 50th annual meeting in Philadelphia.

Their laboratory and animal study is a proof of principle that human spermatogonial stem cells (SSCs) extracted from testicular tissue can morph into insulin-secreting beta islet cells normally found in the pancreas. And the researchers say they accomplished this feat without use of any of the extra genes now employed in most labs to turn adult stem cells into a tissue of choice.

"No stem cells, adult or embryonic, have been induced to secrete enough insulin yet to cure diabetes in humans, but we know SSCs have the potential to do what we want them to do, and we know how to improve their yield," says the study's lead investigator, G. Ian Gallicano, Ph.D., an associate professor in the Department of Cell Biology and Director of the Transgenic Core Facility at GUMC.

Given continuing progress, Gallicano says his strategy could provide a unique solution to treatment of individuals with type 1 diabetes (juvenile onset diabetes). Several novel therapies have been tried for these patients, but each has drawbacks. Transplanting islet cells from deceased donors can result in rejection, plus few such donations are available. Researchers have also cured diabetes in mice using induced pluripotent stem (IPS) cells – adult stem cells that have been reprogrammed with other genes to behave like embryonic stem cells – but this technique can produce teratomas, or tumors, in transfected tissue, as well as problems stemming from the external genes used to create IPS cells, Gallicano says.

Instead of using IPS cells, the researchers turned to a readily available source of stem cells, the SSCs that are the early precursors to sperm cells. They retrieved these cells from deceased human organ donors.

Because SSCs already have the genes necessary to become embryonic stem cells, it is not necessary to add any new genes to coax them to morph into these progenitor cells, Gallicano says. "These are male germ cells as

well as adult stem cells. We found that once you take these cells out of the testes niche, they get confused, and will form all three germ layers within several weeks," he says. "These are true, pluripotent stem cells."

The research team took 1 gram of tissue from human testes and produced about 1 million stem cells in the laboratory. These cells showed many of the biological markers that characterize normal beta islet cells.

They then transplanted those cells into the back of immune deficient diabetic mice, and were able to decrease glucose levels in the mice for about a week – demonstrating the cells were producing enough insulin to reduce hyperglycemia. While the effect lasted only week, Gallicano says newer research has shown the yield can be substantially increased.

The research was funded in part by the American Diabetes Association, patient contributions to the GUMC Office of Advancement, support from GUMC diabetes specialist Stephen Clement, M.D., and a grant from GUMC.

Co-authors include Anirudh Saraswathula, a student at Thomas Jefferson High School for Science and Technology in Alexandria, Va. GUMC researchers Shenglin Chen Ph.D., Stephen Clement, M.D., Martin Dym, Ph.D., and Asif Zakaria, Ph.D., also contributed to the research. The authors report having no personal financial interests related to the study.

http://web.resourceshelf.com/go/resourceblog/62554

Medical Library Mobile (MedLibMob): A New Facebook Group & Twitter Stream

December 13, 2010 00:54

The Facebook group/knowledge community was formed by Guus Van Den Brekel a librarian and social media expert at the University Medical Center in Groningen, The Netherlands.

Medical Library Mobile (MedLibMob) is a closed community. However, you can request to join MedLibMob by clicking the button in the upper-right corner of the public page. Of course, you'll need to logged-in to Facebook if/when you ask to join.

MedLibMob also has a Twitter stream at: http://twitter.com/MedLibMob

From a Description of the Group:

Knowledge community for medical libraries on mobile medical libraries & Medical Apps. Exhange info & experience on existing and future Mobile Medical Library Sites, on existing and future content providers supporting mobile, and very important currently, on relevant Medical Apps for any mobile device on any platform out there (iPad, iPhone, Android etc)

Source: @digicmb (via Twitter)

See Also: Skyscape, a well-known provider of mobile medical reference tools, offers a number of FREE apps for iPhone/iTouch/iPad, Android, Blackberry, and other mobile platforms.

Note: Free Apps Require a Skyscape Account (Also Free)

Some Free Apps Are Only Available For Qualified Medical Professionals

http://www.eurekalert.org/pub_releases/2010-12/mcfg-sdt120610.php

Studies detail triumphs, troubles of African innovators creating products for local health needs

Africans strengthen ability to meet health needs in sub-Sahara with homegrown science solutions, but many products stagnate in labs for want of commercialization know-how, support

Global health experts today published a landmark collection of papers that together provide a unique microscope on the experience of countries, companies and organizations in sub-Saharan Africa addressing neglected health problems with homegrown drugs, vaccines, diagnostics and other creative scientific and business solutions.

The first-of-its kind study chronicles the triumphs and troubles of entrepreneurs, institutes and firms in Africa creating innovative, affordable technologies that bring hope to many sufferers of local diseases. While some have yet to succeed, several organizations cleared major hurdles to finance and create products, some of which may expand into global markets one day.

It is the first research offering a broad range of evidence and concrete examples of African innovation to address local health concerns. The papers draw on the experiences of authorities, researchers and entrepreneurs in Ghana, Kenya, Madagascar, Nigeria, Rwanda, South Africa, Tanzania, and Uganda. In addition to efforts involving health products, the experiences of health venture capital funds in African and other developed countries are profiled.

The papers were produced by Canada's McLaughlin-Rotman Center for Global Health (MRC), at the University Health Network and University of Toronto, and published as a special supplement in the UK-based open-access journal publisher BioMed Central Dec. 12 (with full public access at www.biomedcentral.com/bmcinthealthhumrights/10?issue=S1). One of the papers was published earlier in the

journal Science. The authors hope their work helps scale up and sustain work underway, while inspiring other organizations and countries to follow suit with the benefit of lessons learned by these African pioneers.

Says MRC Director Peter Singer: "If Africans are to prevail over diseases that kill and maim millions each year, they must do so by unleashing the formidable talents of their own African scientists and entrepreneurs. In the long term, the sustainable solutions to Africa's health problems rest with the home team."

"The large firms of the developed world producing drugs, vaccines, diagnostics and other health products are a great resource and partner. But many people will die if we wait for scientists from elsewhere to invent and market the health products Africa needs. These studies demonstrate that, with the right partners and incentives along with support from governments at home and abroad, Africans have the scientific creativity and entrepreneurial talent to improve local health and prosper at the same time."

"Our message to international agencies, donors and African governments: support these enterprises and nurture their potential, because they can make a major contribution to better health in developing countries – and to their own health. At the end of the day, this is about enabling people to solve their own problems, not only using science but also combining it with entrepreneurship."

Since it began in 2004, the MRC has focused extensively on how low-income countries themselves can remedy diseases of poverty. With relatively little profit incentive, firms in rich, developed countries largely neglect such diseases. The MRC has documented the benefits of the homegrown science approach to health problems, which include, beyond affordable products, less dependency on international donor programs and much-needed new economic opportunities and job creation. This collection represents the MRC's largest contribution to date on product commercialization for improving health in Africa.

Examples of African innovation:

***** In Tanzania, local funding, economies of scale, technology transfer, and partnerships all helped the A to Z Textile Company become one of the world's largest producers of long-lasting insecticide treated bed nets, cost-effectively producing tens of millions of nets in an area where malaria is a critical problem. The company succeeded despite regulatory issues, procurement rules, and other barriers.

***** In Madagascar, The Malagasy Institute of Applied Research (IMRA) has created Madeglucyl, a treatment for diabetes management based on a traditional remedy;

***** In Nigeria, the National Institute for Pharmaceutical Research and Development has a plant-based drug for sickle-cell anemia – one of the few low-toxicity drugs available anywhere to treat the debilitating chronic blood disorder – but has yet to overcome barriers to its commercialization;

"Concern over access to essential medicines have dominated international health policy debates over the last two decades," Harvard professor Calestous Juma says in a preface to the work. The debates, centered on intellectual property rights, wrongly assume that Africa will remain "a marginal player in the world of health innovation and will continue to rely on imported solutions.

"This collection of original papers provides a different prognosis. They reveal an emergent 'health innovation system' in Africa that is driven by a combination of local research, entrepreneurship and institutional adaptations."

The research complements a related MRC paper, published Dec. 10 in Science, about so-called "stagnant technologies" in sub-Saharan Africa – products with the potential to save many lives, but which exist only in a lab due to a failure of commercialization or support.

Led by researcher Ken Simiyu, some 25 such products were identified languishing in health research institutions in Africa, some already validated but not yet converted to a product or service. Of the 25 stagnant technologies found, 16 involved traditional plant products; the rest were new drug molecules, diagnostics, vaccines and medical devices.

They include:

***** A low-cost dipstick technology developed at the Noguchi Memorial Institute for Medical Research in Accra, Ghana, for quick, easy, village diagnosis of schistosoma, a parasitic disease that affects more than 50% of people in some areas of Africa.

***** An herbal, anti-malarial medicine, Nibima, from a traditional plant Cryptolepis sanguinolenta, under development at the Centre for Scientific Research into Plant Medicines, Ghana

***** A product called Sunguprot in Kenya from the plant Tylosema Fassoglensis, whose developers claim it can help manage HIV symptoms. Lack of advanced scientific equipment to isolate compounds and funding to carry out clinical trials have affected further development and validation; and

***** An easy-to-use, inexpensive, WHO-approved portable medical-waste incinerator, developed at Makerere University, Uganda, that could solve the problem of hospital waste management in rural areas, especially

during mass polio immunization and similar programmes. The incinerator uses no fuel other than the medical waste and achieves temperatures of 800 degrees C.

Meanwhile, at the International Centre for Insect Physiology and Ecology in Kenya, researchers have patented human odors that effectively repel mosquitoes. While there is a need to determine formulations through further research, negotiations are underway with a multinational company.

Among conclusions of the MRC research teams:

***** Despite challenges, components of health innovation exist in Africa and, though limited, diverse activity in health innovation is occurring;

***** The emerging innovation systems are driven by local health concerns, not external interests. Local, regional and global dynamics affect health innovation;

***** Institutions used innovative financing mechanisms and partnerships to their benefit;

***** All countries put strong emphasis on plant medicine as a local asset for innovation;

***** Fundamental to success are investing in research and development to generate solution-oriented knowledge, providing incentives for entrepreneurs, and building institutional strength to help facilitate commercialization of research results;

***** Africa's health innovation systems are increasingly integrated into the global knowledge ecology, and benefit from extensive international partnerships;

***** Linkages between groups are sparse to date, but hold potential for building stronger health innovation systems. Business incubation through facilities such as science innovation centers will be an important mechanism for fostering industrial clustering and raising economic productivity.

"Driven largely by entrepreneurs, innovative and affordable technologies to improve health in Africa are under development throughout the continent, with firms using a variety of business models in a range of political environments," says MRC researcher Ken Simiyu.

"Clearly, many Africans have the needed talent and know-how. However, the seeds of their efforts need careful nurturing by both donors and African governments at all levels. Required are creative institutions and coherent policies that reduce risk, build on local strengths, and promote the effective use of local health research."

Says Abdallah S. Daar, MRC Senior Scientist and Director of Ethics and Commercialization: "We are all affected in one way or another by the health and well-being of everyone else on Earth. What we present is a look at many African companies and countries striving to create local health products for local needs. Understanding all aspects of their experiences – what worked, what didn't, and what could have been done better – is a huge leg up for other firms and governments who wish to stand on the shoulders of these pioneers."

The papers in full, to be published (with open public access) will be published Sunday Dec. 12 as a special open-access BMC supplement at www.biomedcentral.com/bmcinthealthhumrights/10?issue=S1

A 25-minute interview on this topic with MRC Director Peter Singer and researcher Ken Simiyu is available online from Dec. 12 at www.mrcglobal.org/projects/african_innovation