http://www.science20.com/news_articles/found_34_billionyearold_fossils_sulfurmetabolizing_microbes-81751

Found: 3.4 Billion-Year-Old Fossils Of Sulfur-Metabolizing Microbes

By News Staff | August 21st 2011 10:00 AM

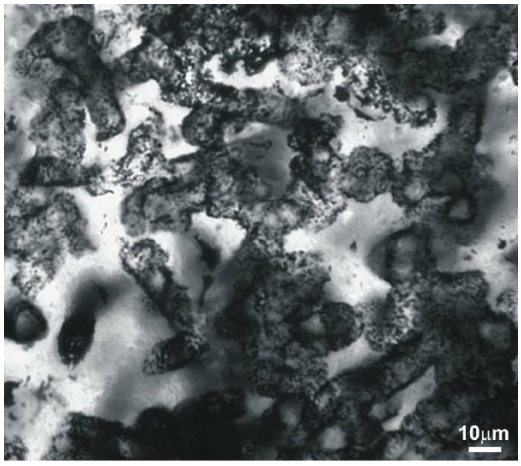
The fossils of 3.4-billion-year-old microbes that used sulfur compounds for energy have been found in rocks from Western Australia, reports a paper published in Nature Geoscience.

David Wacey, Martin Brasier and colleagues analyzed microstructures present in rocks from the Strelley Pool Formation in Western Australia, and determined that they were the fossils of ancient microbes. The fossils were associated with tiny crystals of pyrite, a mineral composed of iron and sulfur. The isotopic composition of the sulfur suggests that the pyrite was formed as a by-product of cellular metabolism based on sulphate and sulfur.

These microfossils are about 200 million years older than previously described microfossils from Palaeo-Archean environments.

The Archean period in the geological record, the first half of Earth's history, and its biosphere composition before the Great Oxidation Event, when life as we know it began to blossom, are of intense interest to researchers who seek to know how early microbial life forms evolved. Sulfur isotopes remain one of the strongest bio-signatures for the early Archean. 2400 million years ago is usually taken to be the date of the Great Oxidation Event.

In terms of helping to understand the Archean biosphere, they say the links between cellular morphology, metabolic by-products and potential electron donors is further evidence of a sulfur-based bacterial ecosystem.



Strelley cells and sheaths. **Photo: David Wacey, UWA and Oxford.**

In this decade, the origin of life and perhaps the possibility of life elsewhere, is of intense research interest. We asked the authors what it means in the context of astrobiology.

"Our evidence - of pyrite clasts in a well washed beach environment - is entirely consistent with the low oxygen hypothesis. The presence of sulfur metabolizing bacteria in direct association with these is consistent with this too, but they can abound within the pores of many modern beach sands, and this should not be taken too far.," said Brasier. "But fossilized sulfur bacteria at 3.4 billion does have interesting astrobiological implications. Sulfur bacteria today can thrive under conditions far from powerful sunlight. If there were redox boundaries, and sources of hydrogen sulfide - such as found around volcanic rocks - then they could flourish in quite remote locations.

"More importantly, if we are correct in our analysis, then we can now see that sulfur bacteria can leave both morphological and geochemical signals behind, provided we look in the right places for the evidence. The challenge is discovering just where to look. Sandstones may hold important clues for early life."

On competing hypotheses regarding the possible composition of the Earth's early biosphere, Wacey, the senior author, who works closely with sulfur isotopes, added, "Possibly the most widely cited evidence for a lack of free oxygen on the early Earth is the style of fractionation of the minor isotopes of sulfur D33S and D36S. The distinct change from large fractionations (before about 2400 Ma) to essentially zero fractionation (after about 2400 Ma) is taken to be the time when appreciable amounts of oxygen came about.

"There is lots of argument about this and much work is going on trying to refine this date back a bit towards maybe 2600 or 2700 Ma, but I think once you are back beyond 3000 Ma very few would argue for appreciable (and certainly not global) oxygen."

Citation: *David Wacey, Matt R. Kilburn, ,Martin Saunders, John Cliff and Martin D. Brasier, 'Microfossils of sulphur-metabolizing cells in 3.4-billion-year-old rocks of Western Australia', Nature Geoscience, DOI: 10.1038/ngeo1238*

http://www.bbc.co.uk/news/health-14591364

Cell recycling system 'damaged in nerve disease'

A breakdown of a recycling system in cells appears to be the underlying cause of a fatal nerve disease.

Amyotrophic lateral sclerosis (ALS), the most common form of motor neuron disease, causes paralysis.

A US team, writing in Nature, found the flaw in the way nerve cells in the brain recycle protein building blocks, which means cells cannot repair themselves and become damaged. Experts in the UK said that the findings were significant.

ALS affects an estimated 350,000 people around the world, including children and adults, with about half of people dying within three years of its onset.

The breakdown occurs in the recycling system in the nerve cells of the spinal cord and the brain.

In order to function properly, the protein building blocks in the cells need to be recycled.

But in ALS, that system is broken. The cell cannot repair or maintain itself and becomes severely damaged.

The scientists found a protein, ubiquilin2, which should be directing the recycling process, does not work in people with ALS. This means the damaged proteins accumulate in nerve cells of the spinal cord and brain, causing their degeneration.

'A big news story'

The researchers, from Northwestern University Feinberg School of Medicine, found this breakdown occurs in all three forms of ALS - hereditary (familial). ALS that is not hereditary (sporadic) and ALS that targets the brain (ALS/dementia).

Lead author Teepu Siddique said: "This opens up a whole new field for finding an effective treatment for ALS. "We can now test for drugs that would regulate this protein pathway or optimise it, so it functions as it should in a normal state."

They also say the finding could have a role to play in other neurodegenerative diseases, including dementia and Parkinson's disease.

Dr Belinda Cupid, head of research development at the UK's Motor Neurone Disease Association, said: "This is a big news story for motor neurone disease research. "We've known for some time that the waste and recycling system in motor neurons is damaged, but this is the first time that there has been direct proof. "This discovery provides researchers with an exciting new avenue to explore as they search for an effective treatment."

http://www.eurekalert.org/pub_releases/2011-08/sumc-ssd081811.php

Stanford study draws connection between narcolepsy and influenza

STANFORD, Calif. - ***The onset of narcolepsy appears to follow seasonal patterns of H1N1 and other upper airway infections, according to a new study of patients in China that was led by Stanford University School of Medicine narcolepsy expert Emmanuel Mignot, MD.***

The findings, which will be published online Aug. 22 in Annals of Neurology, a journal of the American Neurological Association and Child Neurology Society, show that a peak in narcolepsy cases occurred five to seven months after a peak in flu/cold or H1N1 infections in the country.

"Together with recent findings, these results strongly suggest that winter airway infections such as influenza A (including H1N1), and/or Streptococcus pyogenes are triggers for narcolepsy," Mignot, a professor of psychiatry and behavioral sciences, and his colleagues wrote in the paper.

The study follows recent reports that a particular H1N1 vaccine, not one used in the United States or China, seemed to lead to narcolepsy. This new paper, however, found no correlation between vaccination and narcolepsy among the patients studied in China. "The new finding of an association with infection, and not vaccination, is important as it suggests that limiting vaccination because of a fear of narcolepsy could actually increase overall risk," the authors wrote.

Approximately 3 million people worldwide suffer from narcolepsy, a neurological disease that is characterized by daytime drowsiness, irregular sleep at night and cataplexy - a sudden loss of muscle tone and strength. In 2009 Mignot and colleagues confirmed scientists' long-held suspicion that narcolepsy is an autoimmune disease, caused when patients' immune systems kill the neurons that produce the protein hypocretin.

Experts believe that a person has a genetic predisposition to the disease, and some environmental factor kicks his or her immune system into action leading to narcolepsy. As noted in the paper, past studies have shown that Streptococcus pyogenes infections, such as strep throat, have preceded the onset of narcolepsy in Caucasians, suggesting a role for upper airway infections in triggering the disease, Mignot said.

Last year, several European countries reported new cases of narcolepsy in children who had been vaccinated for the H1N1 strain of influenza; children who received the Pandemrix H1N1 vaccine in Finland, for example, faced a ninefold increased risk of narcolepsy. The World Health Organization led an investigation and determined that something about this particular vaccine acted in a "joint effort" with "some other, still unknown factor" to increase risk in those already genetically predisposed. (Pandemrix contains two adjuvants to invoke a stronger immune response; these additives are not included in the H1N1 vaccines used in the United States and China.)

For the new study, the researchers looked at the data of 906 patients who were diagnosed with narcolepsy in Beijing between September 1998 and February 2011, and determined the patients' month of onset of cataplexy and sleepiness. They conducted brief phone interviews with 154 patients whose narcolepsy appeared after October 2009, the date of the first H1N1 vaccination administered in China. The researchers also queried the patients about their history of seasonal flu, H1N1 vaccinations and other diseases.

Mignot's group found that the occurrence of narcolepsy onset was seasonal and significantly influenced by month. Onset was least frequent in November and most frequent in April; there was a five- to seven-month delay between the seasonal peak in flu/cold or H1N1 infections and the peak in narcolepsy onset occurrences.

The paper doesn't show cause and effect, but it does show a strong correlation between narcolepsy onset and this seasonal pattern.

The team also found a threefold increase in disease onset following the 2009-10 H1N1 winter flu pandemic compared with other years. Only a small amount - 5.6 percent - of the patients interviewed recalled receiving an H1N1 vaccine. The onset, the researchers concluded, is unlikely to be explained by vaccinations. Instead, as they wrote in the paper, these winter infections appear to "initiate or reactivate an immune response that leads to hypocretin cell loss and narcolepsy in genetically susceptible individuals."

Mignot said the work is exciting because it provides insight on how the disease is triggered. "We're much closer to understanding what's happening in the autoimmune destruction of hypocretin cells," he explained.

From a public-health standpoint, Mignot said the work suggests that getting vaccinated and avoiding influenza may provide a protective benefit to patients. He said, "It's very possible that being vaccinated with a mild vaccine, one without the adjuvants in question, blocks you from getting a big infection that could increase your risk of narcolepsy."

As for the differences between the findings of the study and what has been observed in Europe, Mignot said it's possible that the strong immune response prompted by the Pandemrix vaccine increases the risk of narcolepsy. He emphasized, however, that more study is needed and that people shouldn't avoid getting vaccinated.

"Even with Pandemrix, it's still a very small risk - and there's a bigger risk from dying of an infection if you don't get vaccinated," he said.

Fang Han, MD, with the Beijing University People's Hospital, is the first author of the study. Mignot's Stanford co-authors include research associate Ling Lin, MD, PhD; postdoctoral scholar Simon Warby, PhD; and senior research scientist Juliette Faraco, PhD. This study was funded by the National Natural Science Foundation of China, the Sino-German Center for Research Promotion, the Beijing Municipal Science & Technology Commission and the National Institutes of Health.
Information about Stanford's Department of Psychiatry and Behavioral Sciences,
Mignot is now in discussion with GlaxoSmithKline, the maker of Pandemrix, about funding new research on the vaccine.

http://www.eurekalert.org/pub_releases/2011-08/w-ssp082211.php

Saffron shows promise in preventing liver cancer

Spice promotes apoptosis and inhibits growth of cancerous cells in animal models

New research suggests that saffron provides a significant chemopreventive effect against liver cancer in animal models. When saffron was administered to rats with diethylnitrosamine (DEN)-induced liver cancer an inhibition of cell proliferation and stimulation of apoptosis was observed. Full findings appear in the September issue of Hepatology, a journal published by Wiley Blackwell on behalf of the American Association for the Study of Liver Diseases.

Hepatocellular carcinoma (HCC), or liver cancer, is the fifth most common cancer and the third leading cause of cancer mortality in the world. Medical evidence has shown that chronic infection with hepatitis B and C are major risk factors for HCC, and exposure to environmental carcinogens, iron overload, fatty liver disease and alcohol abuse can also contribute to development of liver cancer. DEN, an environmental carcinogen, is found in tobacco-smoke, cosmetics, gasoline, and processed foods including milk and meat products.

"In the fight against cancer, there has been much interest in chemopreventive properties of natural herbs and plants," said Prof. Amr Amin from United Arab Emirates University. "With limited treatment options, approaches that prevent cancer development are among the best strategies to protect against the disease." Prior studies have shown that saffron, a naturally derived plant product, possesses antioxidant, anti-cancer, and anti-inflammatory properties. Saffron is a commonly used spice, adding flavor and color to foods, and a possible cancer-fighting substance that is readily available.

In order to further explore the potential of saffron in preventing the development and progression of HCC, DEN was used to induce lesions in rats, mimicking benign and malignant tumors in humans. The research team administered saffron to the animals at 75mg/kg, 150 mg/kg, and 300 mg/kg per day two weeks prior to DEN injection and continued the regimen for 22 weeks.

Results show saffron significantly reduced the number and the incidence of liver nodules, with animals receiving the highest dose of saffron showing complete inhibition of hepatic nodules. Animals that received pre-treatment with saffron displayed a decrease in the elevation of gamma glutamyl transpeptidase, alanine aminotransferase and alpha-fetoprotein (GGT, ALT, αFP)-proteins which indicate liver damage. Furthermore, saffron inhibited the elevation of cells positive for Ki-67, cyclooxygenase 2, inducible nitric oxide synthase,

nuclear factor-kappa Bp-65 and the phosphorylated tumor necrosis factor receptor, all of which have respective roles in the development and progression of cancerous cells.

"Our findings suggest that saffron provides an anti-cancer protective effect by promoting cell death (apoptosis), inhibiting proliferation of cancerous cells, and blocking inflammation," concluded Prof. Amin. "Further investigation of saffron extract and its mechanism of action in HCC is currently underway."

This study is published in Hepatology. Media wishing to receive a PDF of the article may contact healthnews@wiley.com.

Full Citation: *"Saffron: A Potential Candidate for a Novel Anti-Cancer Drug Against Hepatocellular Carcinoma." Amr Amin, Alaaeldin A. Hamza, Khuloud Bajbouj, S. Salman Ashraf, Sayel Daoud. Hepatology; Published Online: July 19, 2011 (DOI: 10.1002/hep.24433); Print Issue Date: September 2011. http://onlinelibrary.wiley.com/doi/10.1002/hep.24433/abstract.*

http://www.eurekalert.org/pub_releases/2011-08/sumc-sri082211.php

Stanford researchers identify possible trigger point of epileptic seizures

STANFORD, Calif. - ***Researchers at the Stanford University School of Medicine have identified a brain-circuit defect that triggers absence seizures, the most common form of childhood epilepsy.***

In a study to be published online Aug. 21 in Nature Neuroscience, the investigators showed for the first time how defective signaling between two key brain areas - the cerebral cortex and the thalamus - can produce, in experimental mice, both the intermittent, brief loss of consciousness and the roughly three-times-per-second brain oscillations that characterize absence seizures in children. Young patients may spontaneously experience these seizures up to hundreds of times per day, under quite ordinary circumstances.

The new findings may lead to a better understanding of how ordinary, waking, sensory experiences can ignite seizures, said John Huguenard, PhD, the study's senior author.

Epilepsy, a pattern of recurrent seizures, will affect about one in 26 people over their lifetime. Absence, or petit-mal, seizures - the form that epilepsy usually takes among children ages 6-15 - feature a sudden loss of consciousness lasting 15 seconds or less. These seizures can be so subtle that they aren't noticed, or are mistaken for lack of attention. The patient remains still for several seconds, as if frozen in place. Usually, a person who experiences an absence seizure has no memory of the episode. "It's like pushing a pause button," said Huguenard, professor of neurology and neurological sciences and of molecular and cellular physiology.

Inside the brain, however, things more resemble an electrical storm than a freeze-frame.

The brain is, in essence, a complicated electrochemical calculating machine employing circuits that process information and share it with other, often-remote circuits, resulting in networks of sometimes staggering complexity. A nerve cell can be thought of as a long, branching wire that can transmit electrical signals along its length and then relay these signals to up to thousands of other nerve cells by secreting specialized chemicals at points of contact with other "wires." Depending on the nature of the signaling interaction, the result can be either excitatory (increasing the likelihood that the next nerve cell in the relay will fire its own electrical impulse) or inhibitory (decreasing that likelihood).

During an absence seizure, the brain's electrical signals spontaneously coalesce into rhythmic oscillations, beginning in the neighborhood of two important brain areas, the cortex and the thalamus. Exactly where or how this pattern is initiated has been a source of controversy, said the study's lead author, Jeanne Paz, PhD, a postdoctoral researcher in Huguenard's lab. "In order to develop better therapies, it is important to understand where and how the oscillations originate," Paz said.

The cortex and thalamus share an intimate relationship. The cortex, like a busy executive, assesses sensory information, draws conclusions, makes decisions and directs action. To keep from being constantly bombarded by distracting sensory information from other parts of the body and from the outside world, the cortex flags its activity level by sending a steady stream of signals down to the thalamus, where nearly all sensory signals related to the outside world are processed for the last time before heading up to the cortex. In turn, the thalamus acts like an executive assistant, sifting through sensory inputs from the eyes, ears and skin, and translating their insistent patter into messages relayed up to the cortex. The thalamus carefully manages those messages in response to signals from the cortex.

These upward- and downward-bound signals are conveyed through two separate nerve tracts that each stimulate activity in the other tract. In a vacuum, this would soon lead to out-of-control mutual excitement, similar to a microphone being placed too close to a P.A. speaker. But there is a third component to the circuit: an inhibitory nerve tract that brain scientists refer to as the nRT. This tract monitors signals from both of the other two, and responds by damping activity. The overall result is a stable, self-modulating system that reliably delivers precise packets of relevant sensory information but neither veers into a chaotic state nor completely shuts itself down.

In bioengineered mice that the Stanford team studied with Wayne Frankel, PhD, of the Jackson Laboratory in Bar Harbor, Maine, this circuit is broken because the GluA4 receptor, a protein component of cells critical to

the stimulation of nRT cells, is missing. Notably, these mice are prone to intermittent absence seizures. The researchers aimed to find out why, by separately studying the mouse's key corticothalamic-circuit components. Using a technique called optogenetics, they were able to selectively switch each of the two stimulatory tracts' signal transmissions on or off at will.

The researchers observed that, as expected, signals from one of the two tracts failed to excite the receptor-deficient mice's inhibitory nRT cells. Oddly, though, signals from the other tract continued to get through to the nRT tract just fine - "a paradoxical and totally surprising result," said Huguenard.

This leaves nRT receiving signals from one tract, but not the other, which upsets the equilibrium usually maintained by the circuit. As a result, one of its components - the thalamocortical tract - is thrown into overdrive. Its constituent nerve cells begin firing en masse, rather than faithfully obeying the carefully orchestrated signals from the cortex. This in turn activates the nRT to an extraordinary degree, because its contact with the thalamocortical tract is not affected in these mice.

Huguenard estimates that, typically, only a very small percentage of nRT cells are firing at a given time. In the face of over-amped signaling from the thalamocortical tract, however, the fraction of excited nRT nerve cells rose much higher, perhaps as much as 50 percent - enough to effectively silence all signaling from the thalamus to the cortex - a key first step in a seizure.

But the shutdown was transitory. A property of thalamic cells (like other nerve cells) is that when they've been inhibited they tend to overreact and respond even more strongly than if they had been left alone. After a burst of nRT firing, this tract's overall inhibition of the thalamocortical tract all but halted activity there for about one-third of a second. Like boisterous schoolchildren who can shut up only until the librarian leaves the room, the thalamocortical cells resumed shouting in unison as soon as the inhibition stopped, and a strong volley of signaling activity headed for the cortex. Then the nRT's inhibitory signaling recommenced, and the stream of signals from the thalamus to the cortex ceased once again.

This three-Hertz cycle of oscillations consisting of alternating quiet and exuberant periods repeated over the course of 10 or 15 seconds was the electrophysiology of a seizure.

Whether the specific nRT defect in the bioengineered mice is important in human absence seizures is not yet known, Huguenard cautioned. Most individuals who suffer from these seizures appear to have "normal" nerve cells (individually indistinguishable from those of non-epileptics) and normally formed circuits as well. But now his group has a model experimental system with which they can try to determine why ordinary experiences can trigger these seizures in everyday life. Behavioral experiments are under way in his lab to see what kinds of common sensory exposures can trip off a similar circuit malfunction in normal mice. The resulting observations may someday help patients control their own exposures to minimize seizures, Huguenard said.

The National Institute of Neurological Disorders and Stroke-funded study's other co-authors were associate professor of bioengineering and of psychiatry and behavioral science Karl Deisseroth, MD, PhD; neurosciences graduate students Astra Bryant and Lief Fenno; research assistant Kathy Peng; and bioengineering postdoctoral researcher Ofer Yizhar, PhD (now at Weizmann Institute of Science in Rehovot, Israel).

http://www.eurekalert.org/pub_releases/2011-08/ip-tiv082211.php

The ignored virus that causes liver cancer

Should we be screening blood for hepatitis G?

Hepatitis G virus was identified in 1995. Some little research was carried out on the virus and the US Food and Drug Administration (FDA) declared it a non-harmful virus in 1997. Researchers in Saudi Arabia, writing in the International Journal of Immunological Studies present evidence to suggest that this may have been the wrong decision. They claim that transmission of the virus through donated blood that was not screened for the virus as well as infection through other routes has led to an increase in cirrhosis of the liver and liver cancer.

Hepatitis G virus (HGV) was renamed as GB virus C (GBV-C) and is a virus in the Flaviviridae family but has not yet been assigned to a genus. Intriguingly, some evidence suggests that co-infection with the AIDS virus, HIV, somehow enhances the immune system in those patients. However, it is the effects of the virus on the livers of otherwise healthy patients that is of concern to Mughis Uddin Ahmed of the King Abdulaziz Hospital (NGHA) in Al-Ahsa, Saudi Arabia. He points out that since the FDA declared the virus not to cause health problems to humans in 1997, no donated blood has been screened for this virus.

However, Mughis Uddin Ahmed has carried out a review of the scientific literature for the last 16 years that show the virus to be quite prevalent around the globe. Moreover, there is a correlation with infection with this virus and hepatitis, cirrhosis of the liver and it is possibly linked to hepatocellular carcinoma. Mughis Uddin Ahmed also found an apparent link with hematological disorders and hematological malignancies.

For this reason, he suggests that research should be carried out into this virus to determine whether it is a true human pathogen and a viral carcinogen. He also advises that screening of donated blood for this virus

should be reinstated urgently rather than healthcare workers continuing to transferring the virus ignorantly to blood recipients and risking the same morbidity and mortality outcomes seen with hepatitis C virus transferred from donor to recipient until screening for that virus was adopted.

"Hepatitis G virus (HGV): where we stand and what to do?" in Int. J. Immunological Studies, 2011, 1, 255-263

http://www.eurekalert.org/pub_releases/2011-08/osu-nsf082211.php

Not so fast - researchers find that lasting evolutionary change takes about 1 million years

CORVALLIS, Ore. – *In research that will help address a long-running debate and apparent contradiction between short- and long-term evolutionary change, scientists have discovered that although evolution is a constant and sometimes rapid process, the changes that hit and stick tend to take a long time.*

Give or take a little, one million years seems to be the magic number. A new study, published this week in Proceedings of the National Academy of Sciences, combined for the first time data from short periods such as 10-100 years with much longer evidence found in the fossil record over millions of years. It determined that rapid changes in local populations often don't continue, stand the test of time or spread through a species.

In other words, just because humans are two or three inches taller now than they were 200 years ago, it doesn't mean that process will continue and we'll be two or three feet taller in 2,000 years. Or even as tall in one million years as we are now.

"Rapid evolution is clearly a reality over fairly short time periods, sometimes just a few generations," said Josef Uyeda, lead author of the study and a zoologist at Oregon State University. "But those rapid changes do not always persist and may be confined to small populations. For reasons that are not completely clear, the data show the long-term dynamics of evolution to be quite slow." Across a broad range of species, the research found that for a major change to persist and for changes to accumulate, it took about one million years. The researchers wrote that this occurred repeatedly in a "remarkably consistent pattern."

"What's interesting is not that we have so much biological diversity and evolutionary change, but that we have so little," Uyeda said. "It's a paradox as to why evolution should be so slow."

Long periods of little change, Uyeda said, are called "stasis," a pattern that originally led to the concept of "punctuated equilibrium," controversial when it was first proposed in the early 1970s. This research supports the overall pattern of stasis and punctuational change. However, Uyeda says there may be different causal mechanisms at work than have often been proposed. "We believe that for changes to persist, the underlying force that caused them has to also persist and be widespread," Uyeda said. "This isn't just some chance genetic mutation that takes over," he said. "Evolutionary adaptations are caused by some force of natural selection such as environmental change, predation or anthropogenic disturbance, and these forces have to continue and become widespread for the change to persist and accumulate. That's slower and more rare than one might think."

Though slow, however, the process appears to be relentless. Most species change so much that they rarely ever last more than 1-10 million years before going extinct, or developing into a new species, the scientists noted.

The exact cause of these long-term, persistent evolutionary changes is not certain. The scientists said that climate change, in itself, does not appear to be a driving force, because many species have remained substantially unchanged over time periods when climates changed dramatically. This study is one of the first of its type to help reconcile the rapid evolution seen by biologists in contemporary species; the slow, stable changes observed by paleontologists; and dramatic, macroevolutionary differences in body sizes.

The research was supported by the National Science Foundation and the Research Council of Norway. It was a collaboration of researchers from OSU, the University of Oslo in Norway and the University of Pretoria in South Africa.

http://medicalxpress.com/news/2011-08-percent-cancer-nurses-unintentionally-exposed.html

17 percent of cancer nurses unintentionally exposed to chemotherapy, study finds

Nearly 17 percent of nurses who work in outpatient chemotherapy infusion centers reported being exposed on their skin or eyes to the toxic drugs they deliver, according to a new study from the University of Michigan Comprehensive Cancer Center.

The study surveyed 1,339 oncology nurses from one state who did not work in inpatient hospital units. About 84 percent of chemotherapy is delivered in outpatient settings, largely by nurses. Results appear online in the journal BMJ Quality and Safety.

"Any unintentional exposure to the skin or eyes could be just as dangerous as a needle stick," says lead study author Christopher Friese, R.N., Ph.D., assistant professor at the U-M School of Nursing. "We have minimized needle stick incidents so that they are rare events that elicit a robust response from administrators. Nurses go

immediately for evaluation and prophylactic treatment. But we don't have that with chemotherapy exposure," Friese says.

Safety guidelines for chemotherapy drug administration have been issued by organizations such as the National Institute for Occupational Safety and Health. But these guidelines are not mandatory. Guidelines include recommendations for using gowns, gloves and other protective gear when handling chemotherapy drugs.

The U-M Comprehensive Cancer Center adheres to these safety guidelines and has procedures in place to implement and enforce them for all staff who administer chemotherapy drugs. U-M nurses did not participate in this study.

The study authors found that practices that had more staffing and resources reported fewer exposures. Also, practices in which two or more nurses were required to verify chemotherapy orders – part of the suggested guidelines – had fewer exposures. "This research shows that paying attention to the workload, the health of an organization, and the quality of working conditions pays off. It's not just about job satisfaction – it's likely to lower the risk of these occupational hazards," Friese says.

Unlike needle sticks where a specific virus is involved and preventive treatments can be given, it's more difficult to link chemotherapy exposure to a direct health effect. That makes it more difficult for health care systems to respond to these incidents. Unintentional chemotherapy exposure can affect the nervous system, impair the reproductive system and confer a future risk of blood cancers.

Friese collaborated in this study with the U-M School of Nursing's Occupational Health Nursing Program, which focuses on training nurses to promote injury prevention and protect against work-related injuries and environmental hazards on the job. By combining this practical occupational health perspective with the expertise of quality and safety researchers, the team hopes to better understand what happens during chemotherapy exposure and what can be done in the work place to prevent it.

"If we ensure patient safety, we should also ensure employee safety by strictly adhering to the national safety guidelines and providing staff education on these guidelines," Friese says.

More information: *Structures and Processes of Care in Ambulatory Oncology Settings and Nurse-Reported Exposure to Chemotherapy, BMJ Quality and Safety, DOI: 10.1136/bmjqs-2011-000178 ; published online Aug. 16, 2011.*

http://news.discovery.com/space/has-earth-brand-life-seeded-the-galaxy-110822.html

Has Earth Brand™ Life Seeded the Galaxy?

By Ian O'Neill | Mon Aug 22, 2011 04:39 PM ET

Despite the fact that, for now, the panspermia mechanism is purely hypothetical, there's lots of fun ideas about how life may hop from planet-to-planet.

In an effort to explain how life was spawned on Earth, scientists have looked at other solar system planets - such as Mars - as possible sources for the terrestrial biology we know and love - or, as I like to call it, Earth Brand™ Life. However, more recently, scientists have been eying Earth as the source for life on other worlds. Wouldn't it be odd that if we detected life on Mars, we find it has a distinct (terrestrial) flavor?

Today, a study published by Universidad Nacional Autonoma de Mexico (UNAM) researchers reveals that Earth Brand™ Life might not have only rained down on neighboring planets, it may have the potential to spread further afield.

In a nutshell, one version of panspermia goes like this: when a sizable meteorite slams into a planetary body, pieces of the planet's crust may be blasted into space after being given the energy to attain "escape velocity" from that planet's gravity. The smaller the planet, the lower the escape velocity, so less energy is needed to blast bits of said planet into space. Therefore, as the logic goes, it's easier to eject bits of Mars than bits of Earth into space - as Earth is more massive than Mars and has a deeper gravitational well.

This is one of the reasons why it's thought there's fewer pieces of Earth floating around in space than pieces of Mars. Indeed, we know for a fact that bits of Mars have made the trip from Mars-to-Earth as we've found meteorites composed of Martian material here on Earth. Our robotic explorers have yet to find terrestrial meteorites on the Martian surface, but they do exist - just in smaller quantities.

So, with all this planetary material flinging around in the inner solar system, has some biology hitched a ride too? Well, that's open to debate and will remain a particularly controversial subject for some time to come. But if Earth is a source of planetary ejecta (regardless of whether or not it's carrying microbes), how far has it traveled? Well, Mauricio Reyes-Ruiz and his UNAM team have carried out the biggest Earth ejecta simulation ever and found a few surprising results.

Firstly, by analyzing 10,242 test particles (ejecta) originating from Earth, a far greater number of them end up on the Martian surface than previously estimated (an increase of two orders of magnitude). This finding will surely bolster the argument that Earth biology (dead or alive) may exist on the Martian surface.

Secondly, at higher ejection speeds (i.e. when the Earth is pummeled by bigger meteorites), the test particles had a higher likelihood of hitting distant Jupiter than landing on neighboring Mars.

As pointed out by the Technology Review's arXiv blog, this provides some tantalizing indications that Earth ejecta, potentially carrying microbes, has slammed into the surface of Jovian moon Europa - one of the handful of gas giant moons that have been singled out as having possible life-nurturing qualities. Europa is thought to harbor a sub-surface ocean, protected by a thick icy crust, with the potential to home complex marine life.

Although the researchers haven't specifically modeled Earth ejecta reaching Europa shores, just the fact pieces of Earth could reach the Jovian system is fascinating enough.

Conscious of the life-spreading potential of their simulated Earth ejecta, the Mexican researchers tracked the test particles for 30,000 (simulated) years to see where they ended up. 30,000 years is the period of time that scientists think the hardiest of Earth bacteria could survive in space in a state of dormancy. Sure enough, the test particles could, theoretically, reach Europa in that time frame.

Another, more far-reaching result of this research is that at higher ejecta velocities, the majority of the test particles are ejected from the solar system all together. Therefore, if there's some characteristic inside the small pieces of terrestrial ejecta that could preserve life for millions of years, this could hint at an Earth Brand™ Life transit method not only throughout the solar system, but to other stars.

But who said biology needed to be "alive" to make panspermia possible, anyway?

http://www.physorg.com/news/2011-08-homo-erectus-master-kitchen.html

Homo erectus was first master of the kitchen: study

The first ancestor of modern humans to have mastered the art of cooking was likely homo erectus, which evolved around 1.9 million years ago, according to a US study published Monday.

The ability to cook and process food allowed homo erectus, the Neanderthals and homo sapiens to make huge evolutionary leaps that differentiated them from chimpanzees and other primates, said researchers at Harvard University.

Based on an analysis of DNA, molar size and body mass among non-human primates, modern humans, and 14 extinct hominids, the findings in the Proceedings of the National Academy of Sciences support previous studies that suggested homo erectus may have known how to cook.

Preparing food with tools and fire meant more calories could be consumed and less time needed to be spent foraging and eating. Molar sizes shrunk while body mass increased. Among primates, animals with larger body sizes grew bigger molars and spent more time eating - great apes of similar size to humans spend about 48 percent of the day consuming calories. "Homo erectus and homo neanderthalensis spent 6.1% and 7%, respectively, of their active day feeding," said the Harvard study, adding that modern humans spend 4.7% of their days eating.

"Human feeding time and molar size are truly exceptional compared with other primates, and their oddity began around the start of the Pleistocene," said the study, referring to the epoch that began about 2.5 million years ago and ended 11,700 years ago.

Cooking may actually have originated with other species that also lived in Africa and came just before homo erectus, including homo habilis and homo rudolfensis, the study said. In any case, the tools and behaviors necessary to support a cooking culture "related to feeding and now necessary for long-term survival of modern humans evolved by the time of homo erectus and before our lineage left Africa."

http://www.eurekalert.org/pub_releases/2011-08/jaaj-dda081911.php

Diastolic dysfunction appears to worsen over time; associated with increased risk of heart failure

Left ventricular diastolic dysfunction is highly prevalent, tends to worsen over time, and is associated with advancing age

A follow-up of participants in a heart function study finds that the prevalence of left ventricular diastolic dysfunction (left ventricular filling [with blood] is abnormal and is accompanied by elevated filling pressures) had increased; that diastolic function had worsened in a nearly a quarter of patients; and that participants who had diastolic dysfunction were more likely to develop heart failure, according to a study in the August 24/31 issue of JAMA.

"There is an emerging emphasis on understanding the progression from heart failure risk factors to asymptomatic ventricular dysfunction and eventually to symptomatic heart failure and death. Therefore, it is important to have population-based information on changes in cardiac function over time," according to background information in the article. "… little is known about time-dependent changes in diastolic function or their relationship to clinical heart failure."

Garvan C. Kane, M.D., Ph.D., of the Mayo Clinic and Medical School, Rochester, Minn., and colleagues conducted a study to measure changes in diastolic function over time and to determine the relationship between diastolic dysfunction and the risk of subsequent heart failure. The study included participants enrolled in the Olmsted County Heart Function Study (OCHFS). Randomly selected participants 45 years or older (n = 2,042) underwent clinical evaluation, medical record abstraction, and echocardiography (examination 1 [1997-2000]). Diastolic left ventricular function was graded as normal, mild, moderate, or severe via testing. After 4 years, participants were invited to return for examination 2 (2001-2004). The group of participants returning for examination 2 (n = 1,402 of 1,960 surviving [72 percent]) then underwent follow-up testing for determination of new-onset heart failure (2004-2010).

The researchers found that from examination 1 to examination 2, the prevalence of diastolic dysfunction of any degree increased from 23.8 percent to 39.2 percent. Moderate or severe diastolic dysfunction increased from 6.4 percent to 16.0 percent. Over 4 years, 23.4 percent of participants experienced worsening of diastolic function, 67.8 percent remained unchanged, and 8.8 percent experienced improved diastolic function. Age was predictive of the development of diastolic dysfunction, especially ages 65 years or older.

In the analysis of the diastolic function of healthy participants (without hypertension, diabetes, coronary artery disease, heart failure, or use of cardiovascular medications), incidence of diastolic dysfunction of any degree increased from 11.3 percent at examination 1 to 29.8 percent at examination 2. Among 423 healthy participants, 19.9 percent showed worsening diastolic function, 75.2 percent remained the same, and 5.0 percent improved.

During 6.3 years of additional follow-up, 81 participants developed heart failure. Age 65 years or older was the strongest predictor of heart failure. The authors found that persistent or worsening diastolic dysfunction was associated with heart failure. "Cumulative heart failure incidence was 2.6 percent in participants whose diastolic function remained normal or normalized between examinations; 7.8 percent in those with persistent, or progression to mild diastolic dysfunction; and 12.2 percent in those with persistent, or progression to moderate or severe diastolic dysfunction. Longitudinal evaluation of participants in the population-based OCHFS cohort reveals that left ventricular diastolic dysfunction is highly prevalent, tends to worsen over time, and is associated with advancing age. Worsening diastolic function can be detected even in apparently healthy persons. Although confirmation in other studies would be helpful, our data suggest that persistence or progression of diastolic dysfunction is a risk factor for heart failure in elderly persons," the researchers conclude.

(JAMA. 2011;306[8]:856-863. Available pre-embargo to the media at www.jamamedia.org)

http://www.eurekalert.org/pub_releases/2011-08/bu-nnm082311.php

Nickel nanoparticles may contribute to lung cancer

New research by an finds that nanoparticles of nickel activate a cellular pathway that contributes to cancer in human lung cells.

PROVIDENCE, R.I. [Brown University] - All the excitement about nanotechnology comes down to this: Structures of materials at the scale of billionths of a meter take on unusual properties. Technologists often focus on the happier among these newfound capabilities, but new research by an interdisciplinary team of scientists at Brown University finds that nanoparticles of nickel activate a cellular pathway that contributes to cancer in human lung cells.

"Nanotechnology has tremendous potential and promise for many applications," said Agnes Kane, chair of the Department of Pathology and Laboratory Medicine in The Warren Alpert Medical School of Brown University. "But the lesson is that we have to learn to be able to design them more intelligently and, if we recognize the potential hazards, to take adequate precautions." Kane is the senior author of the study published in advance online this month in the journal Toxicological Sciences.

Nickel nanoparticles had already been shown to be harmful, but not in terms of cancer. Kane and her team of pathologists, engineers and chemists found evidence that ions on the surface of the particles are released inside human epithelial lung cells to jumpstart a pathway called HIF-1 alpha. Normally the pathway helps trigger genes that support a cell in times of low oxygen supply, a problem called hypoxia, but it is also known to encourage tumor cell growth.

"Nickel exploits this pathway, in that it tricks the cell into thinking there's hypoxia but it's really a nickel ion that activates this pathway," said Kane, whose work is supported by a National Institutes of Health Superfund Research Program Grant. "By activating this pathway it may give premalignant tumor cells a head start."

Size matters

The research team, led by postdoctoral research associate and first author Jodie Pietruska, exposed human lung cells to nanoscale particles of metallic nickel and nickel oxide, and larger microscale particles of metallic

nickel. A key finding is that while the smaller particles set off the HIF-1 alpha pathway, the larger metallic nickel particles proved much less problematic.
In other words, getting down to the nanoscale made the metallic nickel particles more harmful and potentially cancer-causing. Kane said the reason might be that for the same amount of metal by mass, nanoscale particles expose much more surface area and that makes them much more chemically reactive than microscale particles.

Another important result from the work is data showing a big difference in how nickel nanoparticles and nickel oxide nanoparticles react with cells, Pietruska said. The nickel oxide particles are so lethal that the cells exposed to them died quickly, leaving no opportunity for cancer to develop. Metallic nickel particles, on the other hand, were less likely to kill the cells. That could allow the hypoxia pathway to lead to the cell becoming cancerous. "What is concerning is the metallic nickel nanoparticles caused sustained activation but they were less cytotoxic," Pietruska said. "Obviously a dead cell can't be transformed."

Although Kane said the findings should raise clear concerns about handling nickel nanoparticles, for instance to prevent airborne exposure to them in manufacturing, they are not all that's needed to cause cancer. Cancer typically depends on a number of unfortunate changes, Kane said. Also, she said, the study looked at the short-term effects of nickel nanoparticle exposure in cells in a lab, rather than over the long term in a whole organism. Still, in her lab Kane employs significant safeguards to keep researchers safe. "We handle all these materials under biosafety level 2 containment conditions," she said. "I don't want anyone exposed. We're handling them as though they were an airborne carcinogen."

In addition to Kane and Pietruska, other authors on the paper are Ashley Smith, Kevin McNeil, and Anatoly Zhitkovich, a toxicologist; chemist Xinyuan Liu; and engineer Robert Hurt. Kane, Hurt, and Zhitkovich are associated with Brown's Institute for Molecular and Nanoscale Innovation.

http://www.eurekalert.org/pub_releases/2011-08/uol-fwd082311.php

Filling without drilling

Researchers at the University of Leeds have discovered a pain-free way of tackling dental decay that reverses the damage of acid attack and re-builds teeth as new.

The pioneering treatment promises to transform the approach to filling teeth forever.

Tooth decay begins when acid produced by bacteria in plaque dissolves the mineral in the teeth, causing microscopic holes or 'pores' to form. As the decay process progresses these micro-pores increase in size and number. Eventually the damaged tooth may have to be drilled and filled to prevent toothache, or even removed.

The very thought of drilling puts many people off going to see their dentist, whether or not they actually need treatment. This tendency to miss check-ups and ignore niggling aches and pains means that existing problems get worse and early signs of decay in other teeth are overlooked.

It's a vicious cycle, but one that can be broken, according to researchers at the University of Leeds who have developed a revolutionary new way to treat the first signs of tooth decay. Their solution is to arm dentists with a peptide-based fluid that is literally painted onto the tooth's surface. The peptide technology is based on knowledge of how the tooth forms in the first place and stimulates regeneration of the tooth defect.

"This may sound too good to be true, but we are essentially helping acid-damaged teeth to regenerate themselves. It is a totally natural non-surgical repair process and is entirely pain-free too," said Professor Jennifer Kirkham, from the University of Leeds Dental Institute, who has led development of the new technique.

The 'magic' fluid was designed by researchers in the University of Leeds' School of Chemistry, led by Dr Amalia Aggeli. It contains a peptide known as P 11-4 that - under certain conditions - will assemble together into fibres. In practice, this means that when applied to the tooth, the fluid seeps into the micro-pores caused by acid attack and then spontaneously forms a gel. This gel then provides a 'scaffold' or framework that attracts calcium and regenerates the tooth's mineral from within, providing a natural and pain-free repair.

The technique was recently taken out of the laboratory and tested on a small group of adults whose dentist had spotted the initial signs of tooth decay. The results from this small trial have shown that P 11-4 can indeed reverse the damage and regenerate the tooth tissue.

"The results of our tests so far are extremely promising," said Professor Paul Brunton, who is overseeing the patient testing at the University of Leeds Dental Institute. "If these results can be repeated on a larger patient group, then I have no doubt whatsoever that in two to three years time this technique will be available for dentists to use in their daily practice."

"The main reason that people don't go to the dentist regularly is fear. If we can offer a treatment that is completely non-invasive, that doesn't involve a mechanical drill, then we can change that perceived link between dental treatment and pain. This really is more than filling without drilling, this is a novel approach that enables the patients to keep their natural teeth!"

The study is being funded by credentis ag who have licensed the technology and are preparing to introduce P11-4 to dentists worldwide.

http://www.eurekalert.org/pub_releases/2011-08/sfgm-coc082211.php

Coriander oil could tackle food poisoning and drug-resistant infections

Coriander oil has been shown to be toxic to a broad range of harmful bacteria.

Its use in foods and in clinical agents could prevent food-borne illnesses and even treat antibiotic-resistant infections, according to the authors of a study published in the Journal of Medical Microbiology.

The researchers from the University of Beira Interior in Portugal tested coriander oil against 12 bacterial strains, including Escherichia coli, Salmonella enterica, Bacillus cereus and meticillin-resistant Staphylococcus aureus (MRSA). Of the tested strains, all showed reduced growth, and most were killed, by solutions containing 1.6% coriander oil or less.

Coriander is an aromatic plant widely used in Mediterranean cuisine. Coriander oil is one of the 20 most-used essential oils in the world and is already used as a food additive. Coriander oil is produced from the seeds of the coriander plant and numerous health benefits have been associated with using this herb over the centuries. These include pain relief, ease of cramps and convulsions, cure of nausea, aid of digestion and treatment of fungal infections.

This study not only shows that coriander oil also has an antibacterial effect, but provides an explanation for how it works, which was not previously understood. "The results indicate that coriander oil damages the membrane surrounding the bacterial cell. This disrupts the barrier between the cell and its environment and inhibits essential processes including respiration, which ultimately leads to death of the bacterial cell," explained Dr Fernanda Domingues who led the study.

The researchers suggest that coriander oil could have important applications in the food and medical industries. "In developed countries, up to 30% of the population suffers from food-borne illness each year. This research encourages the design of new food additives containing coriander oil that would combat food-borne pathogens and prevent bacterial spoilage," said Dr Domingues. "Coriander oil could also become a natural alternative to common antibiotics. We envisage the use of coriander in clinical drugs in the form of lotions, mouth rinses and even pills; to fight multidrug-resistant bacterial infections that otherwise could not be treated. This would significantly improve people's quality of life."

http://www.physorg.com/news/2011-08-shifting-domestic-roles-men-lost.html

Study finds shifting domestic roles for men who lost jobs in current recession

The acute economic downturn that began in 2008 sometimes is called the "mancession" to reflect its harsher impact on men than women.

As recently as last November, 10.4 percent of adult men were unemployed as compared to 8 percent of adult women. But how do unemployed men cope with their shifting domestic roles, especially when they become financially dependent on a wife or female partner?

One University of Kansas researcher has investigated the impact of joblessness on masculinity and the "breadwinner ideology" within the context of traditional families. "It changes how men think of themselves," said Ilana Demantas, doctoral student in sociology, who has interviewed 20 recently unemployed men. "Usually men see themselves as supporters of the family, and since a lot of them are no longer able to do that alone on their income, they have to construct their identity in a new way to allow them to still think positively of themselves."

Demantas will present her findings at the 106th Annual Meeting of the American Sociological Association.

Working with Kristen Myers, an associate professor of sociology at Northern Illinois University, Demantas found that out-of-work men use an array of strategies to deal with their situations. While some suffer from depression, the KU researcher found among the men she studied that most proudly embrace domestic chores such as childcare and housework.

"Before unemployment, while they very much valued 'women's work,' men still constructed their identity in a way that allowed them to remain in charge," Demantas said. "Working was a way to sort of say, 'I'm the man.' But now managing the family is a way to see themselves as men. So they've actually used 'women's work' to see themselves as contributing to the family. This seems to be a silver lining in a very bleak recession."

Demantas also found that men who were out of work in the recession highly valued the employed women in their families who were still able to bring in a vital income stream.

"They very much felt grateful that women were employed," said Demantas. "One subject said, 'I'm so lucky that my wife is still working, and she has a great insurance policy.' Another said, 'If she weren't working, I'd be sleeping in a car or something.' And some of our subjects take up more household work. One of the subjects

said he woke up early and made coffee for his wife because it was the one nice thing he could do for her since he wasn't contributing economically."

Although the disparity in unemployment statistics between men and women has eased somewhat as the U.S. recession has worn on, Demantas believes that masculinity nonetheless has arrived at a crossroads due to economic pressures. "Men's identities have changed," Demantas said. "They're proud to contribute to the household, to make up for the work their wives are doing. Yet, they still maintain household authority, holding onto their identities as 'men' any way they can."

More information: The paper, "'It's a Blessing That My Wife Still Works:' Balancing Masculinity and Economic Dependence on Women During Unsettled Times," will be presented on Tuesday, Aug. 23, in Caesars Palace Las Vegas, at the American Sociological Association's 106th Annual Meeting. Provided by American Sociological Association

http://www.bbc.co.uk/news/science-environment-14621934

Early forests tamed wild rivers

By Hamish Pritchard Science reporter

The evolution and spread of trees stabilised river banks and changed landscapes around the world forever, geologists say.

Before the switch, broad, shallow, braided river channels could spread and migrate endlessly from side to side. Only when tree-like plants with deep roots took hold some 330 million years ago did river banks finally come under control, say researchers. Their assessment is published in the journal Nature Geoscience.

When the change occurred, rivers became single, deeper channels that meandered slowly across the floodplain, and only occasionally breaking their banks and carving out new channels. The landscape has never looked back - large meandering river channels have dominated the lowlands ever since. These stabilised, fixed-channel flood plains are well watered and can develop deep, organic soil, supporting rich, forested ecosystems.

This new paradigm for landscape and ecosystem evolution comes from field work and an analysis of 330 published studies of river channels preserved in rock strata and exposed in cliff faces.

Neil Davies and Martin Gibling from Dalhousie University, Halifax, Nova Scotia, Canada, describe the appearance of a distinctive pattern of river deposits in sedimentary rocks from the Carboniferous Period that persists in every subsequent geological period.

In some places, the team noted that fossilised trunks and log jams had been preserved in channel sediments, proof that trees were growing along the banks. "The depth and diversity of rooting increased dramatically," write the authors. "This would have greatly boosted the stability of the entire floodplain."

The Carboniferous Period saw complex and varied plant life flourish on Earth. In this period, thick coal deposits formed as plants died and were buried in the swampy plains. These deposits are the basis of our current carbon-based economy.

Flood plains also provide the most fertile farmland on Earth. They allowed early human civilisation to develop, with settled populations and agriculture, and are now home to some of the largest and most densely populated cities.

http://www.newscientist.com/article/dn20819-briefing-security-fears-over-laserenriched-uranium.html

Briefing: Security fears over laser-enriched uranium

15:34 23 August 2011 by Jeff Hecht

It's pretty hard to disguise the fact you are enriching uranium, whether for use in nuclear power stations or bombs. Now a method that uses lasers to complete the process could make it more efficient – and easier to hide.

General Electric and Hitachi are joining forces to build a laser facility in Wilmington, North Carolina, powerful enough to produce more than 1000 tonnes of enriched fuel every year. But could the benefits of laser enrichment – its efficiency and low power requirements – also be its biggest drawbacks?

How does laser enrichment work?

The difference in mass between uranium-235 and the heavier uranium-238 causes small shifts in the wavelengths at which they absorb light. Lasers can be built to emit a narrow range of wavelengths that are absorbed by U-235 but not by U-238. Once the U-235 has become excited, it can be easily separated from the unexcited U-238, typically by a chemical reaction.

What's so good about using lasers?

Conventional enrichment techniques require large amounts of energy to increase the concentration of U-235 from its natural abundance in rock of 0.7 per cent to the roughly 3.6 per cent needed for use in light-water reactors, or the 20 per cent used in fission bombs. Laser techniques promise much better results because they can better select U-235 atoms, meaning far less power is required. However, the details of the process have not been made public.

If it's so good, why is it only being suggested now?

The idea was first mooted as a possibility in the 1960s, and the US began major projects in the 1970s but the technology proved impractical at the time. The current approach was developed only 10 years ago by an Australian company called Silex.General Electric-Hitachi have now licensed Silex's technology. The original process was hampered by inefficient lasers but the fact that GE-Hitachi are prepared to go ahead with a full-scale plant suggests they have developed a more efficient laser.

Why is the idea so controversial?

A key concern is that the high efficiency of a laser enrichment process would reduce energy requirements, allowing a uranium enrichment plant to be smaller and more distant from power sources. That would make it harder to detect using satellite imagery. Such a small plant could also be used to make enriched uranium for atomic bombs – with little chance of being spotted.

What happens next?

The US Nuclear Regulatory Commission is scheduled to review the proposal on 30 June 2012. If the NRC approves the plan, a joint venture called Global Laser Enrichment would build the plant in six stages, eventually reaching a capacity of 6 million work units, a standard measure of enrichment capacity. If the product was standard-grade reactor fuel, the facility could produce more than 1000 tonnes a year.

http://www.newscientist.com/article/mg21128266.300-space-entrepreneurs-may-hold-fate-of-iss.html

Space entrepreneurs may hold fate of ISS

23 August 2011 by Paul Marks

The raft of commercial space firms now vying to put their stamp on the final frontier could have a big say in how long the station is kept in orbit

FOLLOWING the retirement of the space shuttle on 21 July, Americans couldn't have relished the thought of being dependent on Russian Soyuz rockets to get into space. So when Russia's space agency Roskosmos said a week later that the 370-tonne International Space Station would be ditched in the Pacific Ocean in 2020, it must have seemed a hit below the belt.

"So, I guess that's it then," Keith Cowing wrote, on the blog NASAwatch. "Russia gets to make the decision to scrap something we paid the lion's share to build and operate."

It is not quite that simple. Roskosmos was merely reiterating the policy agreed upon by the ISS's partner space agencies in Russia, Europe, Canada, Japan and the US. If the station is still in good shape in 2020, there is an option to extend the station's life by a further eight years. But it is far from clear whether government agencies will still be calling the tune come 2020: the raft of commercial space firms now vying to put their stamp on the final frontier could have a big say in how long the station is kept in orbit.

NASA has already commissioned SpaceX of Hawthorne, California, to run cargo flights to the ISS with its Falcon 9 rocket and uncrewed Dragon capsule. SpaceX is also outfitting its capsule with life-support systems to allow astronauts to go along for the ride. Meanwhile, Virgin Galactic hopes to offer suborbital flights in the air-launched SpaceShipTwo rocket, built by Scaled Composites of Mojave, California, in the next couple of years. It could go further, though.

"It is likely that ISS will be extended beyond the current time frame and such extension may involve some public-private partnership," says George Whitesides, Virgin Galactic CEO and a former NASA chief of staff. "ISS is both an exciting destination in itself and a base for future deep-space operations. Virgin Galactic would certainly be interested in participating in ISS in the future should national agencies be open to the conversation," he says.

Bigelow Aerospace of Las Vegas, Nevada, which has built an expandable Kevlar-based space station module, is currently working on two ISS-related deals. Bigelow director Mike Gold, a member of the Federal Aviation Administration's Commercial Space Transportation Advisory Committee, says the firm is in "advanced discussions" with the commercial Japanese Manned Space Systems Corporation (JAMSS) - which operates the Kibo module on the ISS for the Japanese Space Agency JAXA - to provide it with an orbiting habitat.

The module could be rented out as an ISS storage unit, making the station less dependent on frequent resupply flights, says Hiroshi Kikuchi of JAMSS. To show that the modules are capable of safe, crewed operation, Bigelow is also negotiating with NASA to attach one to a US-owned ISS module.

This commercial activity comes as China prepares to launch its own space station. The US-based Union of Concerned Scientists said this week that it believes it is critical to keep the ISS aloft so China's station isn't the only one come the 2020s. It's too early to say if commercial space flight will help that happen, but the will appears to be there. "We certainly hope that the world can take advantage of the ISS for as long as it proves useful and affordable," says Whitesides.

http://www.scientificamerican.com/article.cfm?id=anger-gives-you-a-creative-boost

Anger Gives You a Creative Boost

A bit of fury helps you think outside of the box

By Brett Q. Ford | Tuesday, August 23, 2011 | 9

We all know anger is bad… right? Generally, it's unpleasant to feel and it often leads to undesirable outcomes. After all, when was the last time you lost your temper with your boss and was pleased with the outcome?

However, perhaps you can also think of times when anger wasn't so bad. Perhaps, in some contexts, feeling angry was actually beneficial. This counterintuitive idea was pursued by researchers Matthijs Baas, Carsten De Dreu, and Bernard Nijstad in a series of studies recently published in The Journal of Experimental Social Psychology. They found that angry people were more likely to be creative – though this advantage didn't last for long, as the taxing nature of anger eventually leveled out creativity. This study joins several recent lines of research exploring the relative upside to anger – the ways in which anger is not only less harmful than typically assumed, but may even be helpful (though perhaps in small doses).

In an initial study, the researchers found that feeling angry was indeed associated with brainstorming in a more unstructured manner, consistent with "creative" problem solving. In a second study, the researchers first elicited anger from the study participants (or sadness, or a non-emotional state) and then asked them to engage in a brainstorming session in which they generated ideas to preserve and improve the environment. In the beginning of this task, angry participants generated more ideas (by volume) and generated more original ideas (those thought of by less than 1 percent or less of the other participants), compared to the other sad or non-emotional participants. However, this benefit was only present in the beginning of the task, and eventually, the angry participants generated only as many ideas as the other participants.

These findings reported by Baas and colleagues make sense, given what we already know about anger. Though anger may be unpleasant to feel, it is associated with a variety of attributes that may facilitate creativity. First, anger is an energizing feeling, important for the sustained attention needed to solve problems creatively. Second, anger leads to more flexible, unstructured thought processes. This flexibility involves the use of broad and inclusive categories and the increased ability to find new connections between categories. People who feel angry (vs. sad, for example) are less likely to think in systematic ways, and are more likely to rely on broad, global cues when judging information. This kind of global processing tends to be associated with literally seeing the "bigger picture."

These findings join the growing body of work showing that negative emotions, like anger, may have beneficial effects in our daily lives. This work, however, is usually accompanied by caveats – anger is not likely to be beneficial in any and all contexts. Rather, anger is likely to be beneficial only in certain situations, or for certain people. Supporting the situation-sensitive nature of the benefits of anger, research I was involved in found that angry people were more likely to perform better in a negotiation, but only when that negotiation was confrontational in nature. Indeed, in these studies, we found that in situations in which anger is likely to be useful – like a confrontational negotiation – participants actually wanted to feel angry and took steps to foster this emotion within themselves.

Supporting the person-sensitive nature of the benefits of anger, another paper recently published in Psychological Science reported that angry people were actually perceived as better leaders, but only when leading people who were less sensitive to conflict. This finding suggests that successful relationships may depend on the alignment between the emotional natures of the partners, even if this alignment involves the experience of anger. Overall, these lines of research demonstrate that anger isn't all bad news. Rather, feeling angry may be downright beneficial, depending on what one is trying to achieve or whom one is trying to impress.

http://www.nytimes.com/2011/08/23/health/23microwave.html?_r=1&partner=rss&emc=rss

Malaria Gets the Foil-in-a-Microwave Treatment

By DONALD G. McNEIL Jr.

What wacky idea has the Bill and Melinda Gates Foundation put $1 million into now? A plan to treat malaria by sticking the patient into a microwave.

O.K., not the whole patient. Probably just an arm or a leg. And not just any microwave oven, but one set at very low power and with the frequency of its electromagnetic field tuned very precisely.

"You can't do this with a kitchen microwave," said Dr. José A. Stoute, a Penn State microbiologist and one of the two inventors of the concept. Other than that, the process is simple: Open special microwave, insert limb, repeat daily.

Dr. Stoute and his co-inventor, Carmenza Spadafora of the Institute for Advanced Scientific Studies in Panama, were originally given $100,000 by the Gates Foundation after writing a two-page proposal suggesting

microwaves could safely kill malaria parasites in the blood. Dr. Spadafora proved the idea worked in a petri dish. The new $1 million is to see if it works in mice.

"There's a lot of data on mice exposed to microwaves, so we think we'll be able to stay well below their level of safety," Dr. Stoute said, in a tone probably less reassuring to mice than to men.

The idea, he said, is based on the fact that malaria parasites invade red blood cells and eat the hemoglobin inside them. Hemoglobin contains iron - and, as any bozo who's ever tried to heat up a sandwich wrapped in tinfoil knows, it's a bad idea to microwave metal.

Of course, the red cells containing parasites are floating along in arteries right next to healthy red cells, so whatever damage the microwave does to the parasites cannot be visited on the healthy cells, too.

And that, Dr. Stoute said, is where a crucial difference comes in: When a malaria parasite digests hemoglobin, it converts the iron into an inert crystalline pigment called hemozoin. The parasite must do that because free iron will tear oxygen atoms off things the parasite wants intact, like its cell membrane. The hemozoin crystals, packed with concentrated iron, are pushed into the parasite's food vacuole - the empty space where a rudimentary creature that does not have a gut dumps its waste products. Drifting into an electromagnetic field with a vacuole full of hemozoin is about as brainy as stepping into a microwave with a stomach full of nails. But parasites don't have brains, either.

Dr. Stoute and Dr. Spadafora have shown that they can fine-tune a custom-built microwave so that only the parasites are damaged. Their theory is that the heated-up hemozoin swells the vacuoles till they pop, unleashing an acid bath on the parasite's innards.

The microwave is built from commercially available parts, but puts out less than one-thousandth the power of a kitchen model.

The idea, Dr. Stoute said, evolved as he and Dr. Spadafora were tossing around proposals that might land them a Gates grant. Malaria parasites inevitably become resistant to every new drug, so the foundation is interested in new ways to kill them.

Dr. Stoute kept nixing Dr. Spadafora's ideas, he recalled. "She finally said, 'What do you want - a magic ray?' And I remembered reading a study about using microwaves on cancer cells after tagging them with iron. I thought, 'Parasites come with their own iron. Why don't we try this?' "

Even if the approach works in mice, all sorts of problems will have to be worked out before it is tested on humans, Dr. Stoute said. Hot spots like those that a microwave creates in liquids must be avoided. And any patient will undoubtedly need treatments for several days in a row, because the parasites hide in the brain, liver and spleen - and microwaving the head or abdomen is probably a bad idea.

"But eventually they have to come back out into the blood," he said, "and that's when we'll get them."

Dr. Stoute has not discussed his idea widely, but one person he told was Dr. Gray Heppner, the former chief of malaria vaccine development at the Walter Reed Army Institute of Research.

"I think it's a long shot, but I think it's a brilliant idea," Dr. Heppner said. "Microwaves are not ionizing radiation. They cause heat. If he can get them to cause very local heat, there's an exquisite differential susceptibility that might make it possible. And if anyone can carry this off, it's José."

Dr. Heppner, a retired colonel, said Dr. Stoute did "brilliant jobs" running a hospital in the Persian Gulf war and a malaria research project in Kenya.

Stephen Ward, the first Gates Foundation official to see the grant application, said his initial reaction was: "This is an absolutely crazy idea."

"But once you understand the underlying biology," he added, "it's a crazy idea that just might work."

A different grant applicant, he said, had proposed a malaria test using hemozoin, which helped him better understand the key role the crystal plays in malaria. Another advantage, said Dr. David Brandling-Bennett, head of the foundation's malaria strategy team, was that if the technology works, it may be practical to use in poor countries.

"We want things that, in theory, are low in cost and make reasonable power demands, that might even run on batteries or solar power," he said. "We wouldn't be interested if it was expensive and usable only in a tertiary hospital in the first world, like an M.R.I."

He could imagine many future uses, he said. The simplest would be a microwave that could be used on bags of donated blood if malaria tests were not available. And his wildest vision was an airport scanner that would cure malaria as immigrants walked through it - and do it so harmlessly that there would not even be a need to test them first.

http://www.newscientist.com/blogs/shortsharpscience/2011/08/coolest-brown-dwarf-discovered.html

Coolest brown dwarf discovered

Lisa Grossman, reporter

The coolest stars in the galaxy have finally come out of hiding.

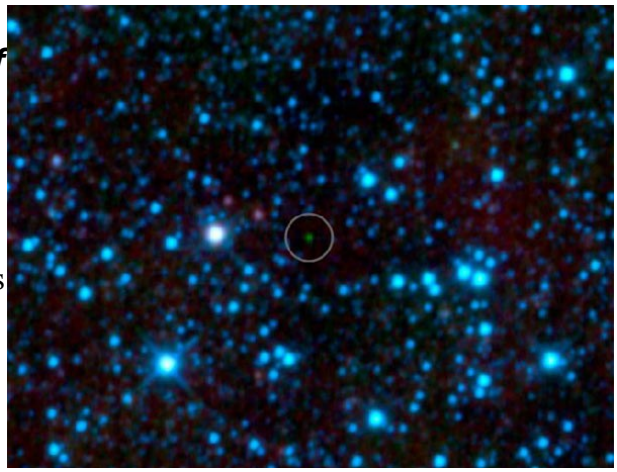


Image: NASA/JPL-Caltech/UCLA

Astronomers using data from NASA's Wide-field Infrared Survey Explorer (WISE) have found six chilly almost-stars called Y dwarfs, which had been hunted unsuccessfully for more than a decade.

Y dwarfs are the coldest class of brown dwarfs, star-like bodies that are too low-mass to fuse hydrogen in their cores. These "failed stars" don't burn the way stars like our sun do, meaning they do not emit visible wavelengths that most telescopes can spot.

But they still give off some heat, which WISE can detect. Between January 2010 and February 2011, the space telescope scanned the sky 1.5 times and bagged 100 brown dwarfs. Six of those were Y dwarfs, hitherto-theoretical bodies cooler than 226 °Celsius. One of them, WISE 1828+2650, is cooler than 25 °C, making it the coolest brown dwarf ever discovered. Another candidate brown dwarf, reported in March, appears to be 30 °C, but before that the coolest one was about 100 °C.

"The brown dwarfs we were turning up before this discovery were more like the temperature of your oven," Davy Kirkpatrick of the California Institute of Technology in Pasadena, says in a press release. "With the discovery of Y dwarfs, we've moved out of the kitchen and into the cooler parts of the house."

The Y dwarfs are between 9 and 40 light years from the sun. Our celestial neighbourhood may be full of these ultra-cool stars that we haven't spotted yet, says Michael Cushing of NASA's Jet Propulsion Laboratory in Pasadena. "Finding brown dwarfs near our sun is like discovering there's a hidden house on your block that you didn't know about," he says. "It's thrilling to me to know we've got neighbours out there yet to be discovered."

http://www.newscientist.com/article/dn20821-surgeons-may-be-adapting-to-safe-xray-doses.html

Surgeons may be adapting to 'safe' X-ray doses

00:05 24 August 2011 by Jessica Hamzelou

Hospital workers exposed regularly to "safe" levels of X-rays have experienced changes at the cellular level that might prove beneficial.

Gian Luigi Russo and colleagues at Italy's National Research Council took blood samples from 10 cardiologists who are exposed to 4 millisieverts of radiation per year from X-ray-guided surgery. Those levels are slightly above average natural levels but well within the US Code of Federal Regulation's safe limit of 50 millisieverts per year.

Russo's team found that the blood contained levels of hydrogen peroxide – a marker of cell damage – three times higher than expected. White blood cells in the samples also showed a marker that suggested they were more susceptible to death. On the flip side, the blood also contained twice the normal level of glutathione, an antioxidant that protects cells.

Friend or foe?

Russo says the results provide the first evidence that "safe" radiation levels can induce profound biochemical and cellular changes – but it is unclear whether those changes are damaging or beneficial.

"The risk associated with low doses of radiation is very controversial," says Mark Hill at the University of Oxford, who was not involved in the study. Cells that are more susceptible to death will be easier for the body to remove if they become dangerously damaged, which might lower the risk that they will trigger conditions such as cancer. "However, people have also argued that the removal of cells will stimulate other cells to divide, which may act to promote cancer."

Tommaso Gori, a cardiologist at the University Medical Center Mainz in Germany, points out that boosted antioxidant levels are known to offer a degree of protection against heart attack in some individuals. "What doesn't kill you makes you stronger," he says. "That might be the case with low-dose radiation."

Journal reference: European Heart Journal, DOI: 10.1093/eurheartj/ehr263

http://www.eurekalert.org/pub_releases/2011-08/nau-rus082311.php

Researchers uncover source of Haitian cholera outbreak

Researchers have pinpointed the source of a cholera outbreak in Haiti that killed more than 6,000 people and sickened 300,000.

Employing technology that reads the entire DNA code, researchers led by the Translational Genomics Research Institute and the Technical University of Denmark have pinpointed the source of a cholera outbreak in Haiti that killed more than 6,000 people and sickened 300,000. Paul Keim, Regents Professor of biology at Northern Arizona University and director of the TGen Pathogen Genomics Division, served as senior molecular biologist on the study, and NAU's Center for Microbial Genetics and Genomics also contributed.

Using whole genome sequencing, which spells out the billions of chemical bases in DNA, the team of researchers provided the strongest evidence yet that peacekeepers from Nepal, where cholera is widespread, brought the disease to Haiti. The Nepalese soldiers were responding to assist the island nation that was reeling from a devastating earthquake in January 2010 that killed more than 300,000.

In the study, titled "Population genetics of Vibrio Cholerae from Nepal: An identical clone in Nepal and the Haitian outbreak," researchers confirm the source of the cholera, and suggest how to prevent future outbreaks when international aid is rushed to disaster areas.

The study appeared Tuesday, Aug. 23, in mBio, a new online-only, open-access journal published by the American Society of Microbiology in partnership with the American Academy of Microbiology.

"The great similarity of Haitian cholera with Nepalese cholera is based upon the highest resolution DNA methods available, and point to a probable source of this devastating disease outbreak," said Keim, who in 2001 assisted the FBI in tracking down the source of the anthrax letters case, which killed five people. He said similar genetic tracking techniques were used in investigating the Haitian cholera outbreak.

According to Keim, methods pioneered during the anthrax letter forensic investigation and today's greatly diminished costs for whole genome sequencing make it possible to apply this powerful technology to new and critical public health challenges.

Keim praised TGen's collaborators at the National Public Health Laboratory in Nepal, and at the National Food Institute in Denmark, where the study's senior author, Frank M. Aarestrup, is head of the Antimicrobial Resistance and Molecular Epidemiology Unit.

Lance Price, an associate professor at TGen and co-author of the new study, said the investigation into the source of Haitian cholera could help prevent such outbreaks in the future.

"This effort validates the power of advanced molecular tools in investigating outbreaks of this nature," Price said. "The goal now should be finding ways to prevent such outbreaks, perhaps through screening prior to deployment. This study is not about placing blame, it's about preventing such disasters in the future."
Researchers confirmed the source of the outbreak by comparing the DNA of 24 cholera samples (the bacterium Vibrio cholera) from five different districts in Nepal with 10 samples of cholera from Haiti. All 24 samples from Nepal matched the samples from Haiti. Some of the samples, the report said, "were almost identical."

http://medicalxpress.com/news/2011-08-asleep-wheel-deprivation-effect-cognition.html

Asleep at the wheel: Investigating sleep deprivation's effect on cognition

The next time you choose to pull an all-nighter, cramming for a test or preparing for a work presentation, think again - you're likely damaging the exact neurological systems you hope to utilize for success.

The negative effect of a lack of sleep on cognitive abilities like memory may not seem like news. In fact, it is anecdotally taught to us from a very young age. But until now there has been limited understanding of the behind-the-scenes biological explanation for the deficits.

"The main interest of my lab is how memories are stored," says Ted Abel, Brush Family Professor of Biology and Director of the Biological Basis of Behavior Program. "In particular, how the neural circuits and molecular mechanisms in the brain that enable us to remember long-term can change over time and become stronger and modified. Sleep deprivation offers a window into this world."

In order to study the effects of sleep deprivation, Abel's team trained mice to explore certain objects in a field. Once the mice had become familiar with the specific locations, researchers tested the animals' memory the next day by moving a certain object. When fully rested, the animals remembered where the objects had initially been. Intrigued by the movement of a single object, they investigated it with heightened interest - much like a human might.

Next, using a method called gentle handling - petting the mice to keep them awake longer than usual - their ability to remember if and when a certain object was moved was again evaluated. As a consequence of losing

sleep, the object that had once fascinated the mice no longer appealed to them, suggesting they no longer recalled its original position.

"It wasn't even that drastic a level of sleep deprivation," Abel says. "The mice got about half the amount of sleep they would regularly get. In humans it would amount to about four hours. It just goes to show that that amount of reduction alone is enough to have a drastic effect on memory."

When they dug deeper into the processes responsible for this result, Abel's lab set upon a neuronal support cell called glia - Latin for glue. The glial cells wrap around neuronal processes where synapses form. This is particularly important when the brain is being made to work extra hard. Sleep deprivation is a prime example - the longer you stay awake, the more your neurons fire, supplementing motor faculties and mental capabilities as the day wears on. The glial cells are trying to preserve the function of these overworked neurons.

"We discovered that one of the molecules released by glia - adenosine - was actually causing the effects of sleep deprivation," says Abel. "We should all be familiar with adenosine in a cursory way - when we go to Starbucks to buy coffee, we're actually blocking the effect of that molecule. So in essence this adenosine - by way of the glial support cells - is protecting our brain from running on empty, telling us in its own unique biological language to get some sleep."

Studying neuronal function during sleep is crucial to better understanding memory storage. A common misconception is that when we sleep, the brain stands still - that it shuts down to recover. Nothing could be further from the truth. Neurons are actually firing at an incredibly high rate during sleep, even faster than during wakeful hours. In fact, these high-firing cells that activate during non-REM sleep are often the same ones that were firing during the spatial tests, Abel says, suggesting memories are replayed during sleep, possibly in the form of dreams.

"Because almost all sleep studies look at the removal of sleep, we'd like to study these processes in even further detail and concentrate on the addition of sleep - that is to say, what exactly is going on inside the brain that makes a good night's sleep so important? There's plenty of anecdotal evidence of sleep's recuperative value, but we'd like to dig deeper and study these interactions on a molecular level."

Abel's team hopes the research will offer insight into neurodegenerative diseases like Alzheimer's, and neuropsychiatric disorders like schizophrenia - both often associated with alterations in sleep. A better understanding of memory storage might eventually lead to the ability to supplement existing treatments and target the specific cognitive deficits associated with these diseases to improve quality of life.

Provided by University of Pennsylvania

http://articles.boston.com/2011-08-23/news/29919261_1_heart-attacks-artery-tiny-balloon

Hospitals beating deadline for treating heart attacks

August 23, 2011|By Marilynn Marchione, Associated Press

NEW YORK - *In a spectacular turnabout, hospitals are treating almost all major heart attack patients within the recommended 90 minutes of arrival, a new study finds.*

Just five years ago, less than half of them got the patients' clogged arteries opened that fast.

The time it took to treat such patients plunged from a median of 96 minutes in 2005 to only 64 minutes last year, researchers found.

Some hospitals are moving at warp speed: Linda Tisch was treated in a mere 16 minutes after she was stricken while visiting relatives near Yale-New Haven Hospital in Connecticut this month. Emergency responders called ahead to mobilize a team of heart specialists. Once she arrived, "they had a brief conversation, and I went straight into the OR. My family was absolutely flabbergasted,'' said Tisch, 58, who went home to Westerly, R.I., two days later.

Tisch's case was not a fluke. The hospital took 26 minutes on another stricken patient Thursday. "Americans who have heart attacks can now be confident that they're going to be treated rapidly in virtually every hospital of the country,'' said a Yale cardiologist, Dr. Harlan Krumholz. He led the study, published online yesterday by an American Heart Association journal, Circulation.

What is remarkable about this improvement, Krumholz said, is that it occurred without money incentives or threat of punishment. Instead, the government and a host of private groups led research on how to shorten treatment times and started campaigns to persuade hospitals that this was the right thing to do.

Heart attacks are caused by clogged arteries that prevent enough oxygen and blood from reaching the heart. Each year, about 250,000 people in the United States and more than 3 million worldwide suffer a major one, where a main artery is completely blocked. The best remedy is angioplasty, in which doctors push a tube through an artery to the clog, inflate a tiny balloon to flatten it, and place a mesh prop called a stent to keep the artery open.

http://www.reuters.com/article/2011/08/24/us-saudi-archaeology-idUSTRE77N5TL20110824

Saudi Arabia discovers 9,000 year-old civilization

JEDDAH, Saudi Arabia (Reuters) - *Saudi Arabia is excavating a new archeological site that will show horses were domesticated 9,000 years ago in the Arabian peninsula, the country's antiquities expert said Wednesday.*

The discovery of the civilization, named al-Maqar after the site's location, will challenge the theory that the domestication of animals took place 5,500 years ago in Central Asia, said Ali al-Ghabban, Vice-President of Antiquities and Museums at the Saudi Commission for Tourism & Antiquities.

"This discovery will change our knowledge concerning the domestication of horses and the evolution of culture in the late Neolithic period," Ghabban told a news conference in the Red Sea port of Jeddah. "The Maqar Civilization is a very advanced civilization of the Neolithic period. This site shows us clearly, the roots of the domestication of horses 9,000 years ago." The site also includes remains of mummified skeletons, arrowheads, scrapers, grain grinders, tools for spinning and weaving, and other tools that are evidence of a civilization that is skilled in handicrafts.

Saudi Arabia, the world's largest oil exporter, is trying to diversify its economy away from oil and hopes to increase its tourism. Last year the SCTA launched exhibitions in Barcelona's CaixaForum museum and Paris's Louvre museum showcasing historic findings of the Arabian Peninsula. *(Reporting by Asma Alsharif; Editing by Angus MacSwan)*

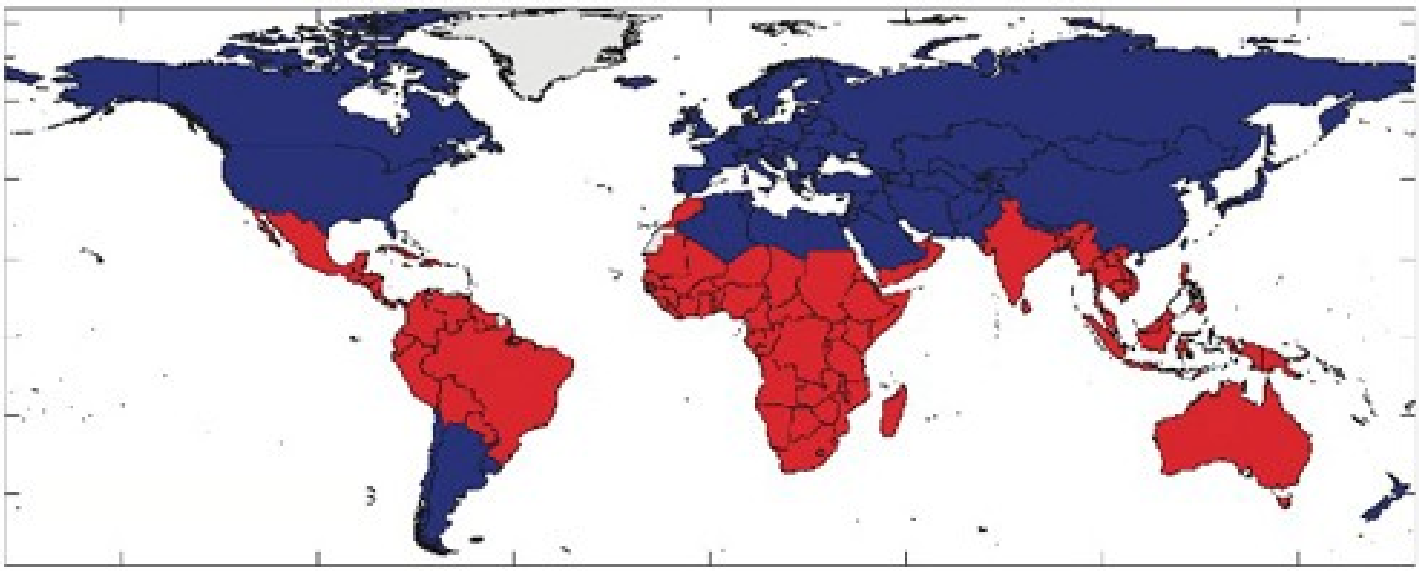
http://www.eurekalert.org/pub_releases/2011-08/teia-cca081911.php

Climate cycles are driving wars, says study

When El Nino warmth hits, tropical conflicts double

In the first study of its kind, researchers have linked a natural global climate cycle to periodic increases in warfare. The arrival of El Niño, which every three to seven years boosts temperatures and cuts rainfall, doubles the risk of civil wars across 90 affected tropical countries, and may help account for a fifth of worldwide conflicts during the past half-century, say the authors. The paper, written by an interdisciplinary team at Columbia University's Earth Institute, appears in the current issue of the leading scientific journal Nature.
In recent years, historians and climatologists have built evidence that past societies suffered and fell due in connection with heat or droughts that damaged agriculture and shook governments. This is the first study to make the case for such destabilization in the present day, using statistics to link global weather observations and well-documented outbreaks of violence. The study does not blame specific wars on El Niño, nor does it directly address the issue of long-term climate change. However, it raises potent questions, as many scientists think natural weather cycles will become more extreme with warming climate, and some suggest ongoing chaos in places like Somalia are already being stoked by warming climate.

"The most important thing is that this looks at modern times, and it's done on a global scale," said Solomon M. Hsiang, the study's lead author, a graduate of the Earth Institute's Ph.D. in sustainable development. "We can speculate that a long-ago Egyptian dynasty was overthrown during a drought. That's a specific time and place, that may be very different from today, so people might say, 'OK, we're immune to that now.' This study shows a systematic pattern of global climate affecting conflict, and shows it right now."



El Nino drought cycles heavily affecting some 90 countries (red) appear to be helping drive modern civil wars. **Credit: Hsiang et al./Nature**

The cycle known as the El Niño-Southern Oscillation, or ENSO, is a periodic warming and cooling of the tropical Pacific Ocean. This affects weather patterns across much of Africa, the Mideast, India, southeast Asia, Australia, and the Americas, where half the world's people live. During the cool, or La Niña, phase, rain may be relatively plentiful in tropical areas; during the warmer El Niño, land temperatures rise, and rainfall declines in most affected places. Interacting with other factors including wind and temperature cycles over the other oceans, El Niño can vary dramatically in power and length. At its most intense, it brings scorching heat and multi-year droughts. (In higher latitudes, effects weaken, disappear or reverse; La Niña conditions earlier this year helped dry the U.S. Southwest and parts of east Africa.)

The scientists tracked ENSO from 1950 to 2004 and correlated it with onsets of civil conflicts that killed more than 25 people in a given year. The data included 175 countries and 234 conflicts, over half of which each caused more than 1,000 battle-related deaths. For nations whose weather is controlled by ENSO, they found that during La Niña, the chance of civil war breaking out was about 3 percent; during El Niño, the chance doubled, to 6 percent. Countries not affected by the cycle remained at 2 percent no matter what. Overall, the team calculated that El Niño may have played a role in 21 percent of civil wars worldwide - and nearly 30 percent in those countries affected by El Niño.

Coauthor Mark Cane, a climate scientist at Columbia's Lamont-Doherty Earth Observatory, said that the study does not show that weather alone starts wars. "No one should take this to say that climate is our fate. Rather, this is compelling evidence that it has a measurable influence on how much people fight overall," he said. "It is not the only factor - you have to consider politics, economics, all kinds of other things." Cane, a climate modeler, was among the first to elucidate the mechanisms of El Niño, showing in the 1980s that its larger swings can be predicted - knowledge now used by organizations around the world to plan agriculture and relief services.

The authors say they do not know exactly why climate feeds conflict. "But if you have social inequality, people are poor, and there are underlying tensions, it seems possible that climate can deliver the knockout punch," said Hsiang. When crops fail, people may take up a gun simply to make a living, he said. Kyle C. Meng, a sustainable-development Ph.D. candidate and the study's other author, pointed out that social scientists have shown that individuals often become more aggressive when temperatures rise, but he said that whether that applies to whole societies is only speculative.

Bad weather does appear to tip poorer countries into chaos more easily; rich Australia, for instance, is controlled by ENSO, but has never seen a civil war. On the other side, Hsiang said at least two countries "jump out of the data." In 1982, a powerful El Niño struck impoverished highland Peru, destroying crops; that year, simmering guerrilla attacks by the revolutionary Shining Path movement turned into a full-scale 20-year civil war that still sputters today. Separately, forces in southern Sudan were already facing off with the domineering north, when intense warfare broke out in the El Niño year of 1963. The insurrection abated, but flared again in 1976, another El Niño year. Then, 1983 saw a major El Niño - and the cataclysmic outbreak of more than 20 years of fighting that killed 2 million people, arguably the world's bloodiest conflict since World War II. It culminated only this summer, when South Sudan became a separate nation; fighting continues in border areas. Hsiang said some other countries where festering conflicts have tended to blow up during El Niños include El Salvador, the Philippines and Uganda (1972); Angola, Haiti and Myanmar (1991); and Congo, Eritrea, Indonesia and Rwanda (1997).

The idea that environment fuels violence has gained currency in the past decade, with popular books by authors like Jared Diamond, Brian Fagan and Mike Davis. Academic studies have drawn links between droughts and social collapses, including the end of the Persian Gulf's Akkadian empire (the world's first superpower), 6,000 years ago; the AD 800-900 fall of Mexico's Maya civilization; centuries-long cycles of warfare within Chinese dynasties; and recent insurgencies in sub-Saharan Africa. Last year, tree-ring specialists at Lamont-Doherty Earth Observatory published a 1,000-year atlas of El Niño-related droughts; data from this pinpoints droughts coinciding with the downfall of the Angkor civilization of Cambodia around AD 1400, and the later dissolution of kingdoms in China, Vietnam, Myanmar and Thailand.

Some scientists and historians remain unconvinced of connections between climate and violence. "The study fails to improve on our understanding of the causes of armed conflicts, as it makes no attempt to explain the reported association between ENSO cycles and conflict risk," said Halvard Buhaug, a political scientist with the Peace Research Institute Oslo in Norway who studies the issue. "Correlation without explanation can only lead to speculation." Another expert, economist Marshall Burke of the University of California, Berkeley, said the authors gave "very convincing evidence" of a connection. But, he said, the question of how overall climate change might play out remains. "People may respond differently to short-run shocks than they do to longer-run

changes in average temperature and precipitation," he said. He called the study "a useful and illuminating basis for future work."

http://www.eurekalert.org/pub_releases/2011-08/cmon-doa081911.php

Discovery of a 160-million-year-old fossil represents a new milestone in early mammal evolution

Pittsburgh, Pennsylvania - ***A remarkably well-preserved fossil discovered in northeast China provides new information about the earliest ancestors of most of today's mammal species - the placental mammals.***

According to a paper published August 25 in the prestigious journal Nature, this fossil represents a new milestone in mammal evolution that was reached 35 million years earlier than previously thought, filling an important gap in the fossil record and helping to calibrate modern, DNA-based methods of dating the evolution.

The paper by a team of scientists led by Carnegie Museum of Natural History paleontologist Zhe-Xi Luo describes Juramaia sinensis, a small shrew-like mammal that lived in China 160 million years ago during the Jurassic period. Juramaia is the earliest known fossil of eutherians - the group that evolved to include all placental mammals, which provide nourishment to unborn young via a placenta. As the earliest known fossil ancestral to placental mammals, Juramaia provides fossil evidence of the date when eutherian mammals diverged from other mammals: metatherians (whose descendants include marsupials such as kangaroos) and monotremes (such as the platypus). As Luo explains, "Juramaia, from 160 million years ago, is either a great-grand-aunt, or a 'great-grandmother' of all placental mammals that are thriving today."

The "Jurassic mother from China"

The fossil of Juramaia sinensis was discovered in the Liaoning Province in northeast China and examined in Beijing by Zhe-Xi Luo and his collaborators: Chong-Xi Yuan and Qiang Ji from the Chinese Academy of Geological Sciences, and Qing-Jin Meng from the Beijing Museum of Natural History, where the fossil is stored. The name Juramaia sinensis means "Jurassic mother from China." The fossil has an incomplete skull, part of the skeleton, and, remarkably, impressions of residual soft tissues such as hair. Most importantly, Juramaia's complete teeth and forepaw bones enable paleontologists to pin-point that it is closer to living placentals on the mammalian family tree than to the pouched marsupials, such as kangaroos.

Resetting the evolutionary clock

"Understanding the beginning point of placentals is a crucial issue in the study of all mammalian evolution," says Luo. The date of an evolutionary divergence - when an ancestor species splits into two descendant lineages - is among the most important pieces of information an evolutionary scientist can have. Modern molecular studies, such as DNA-based methods, can calculate the timing of evolution by a "molecular clock." But the molecular clock needs to be cross-checked and tested by the fossil record. Prior to the discovery of Juramaia, the divergence point of eutherians from metatherians posed a quandary for evolutionary historians: DNA evidence suggested that eutherians should have shown up earlier in the fossil record - around 160 million years ago. Yet, the oldest known eutherian, was Eomaia*, dated to 125 million years ago. The discovery of Juramaia gives much earlier fossil evidence to corroborate the DNA findings, filling an important gap in the fossil record of early mammal evolution and helping to establish a new milestone of evolutionary history.

Juramaia also reveals adaptive features that may have helped the eutherian newcomers to survive in a tough Jurassic environment. Juramaia's forelimbs are adapted for climbing; since the majority of the Jurassic mammals lived exclusively on the ground, the ability to escape to the trees and explore the canopy might have allowed eutherian mammals to exploit an untapped niche.

Luo supports this perspective: "The divergence of eutherian mammals from marsupials eventually led to placental birth and reproduction that are so crucial for the evolutionary success of placentals. But it is their early adaptation to exploit niches on the tree that paved their way toward this success."

**Eomaia was originally described in 2002 by a team of scientists led by Zhe-Xi Luo and Carnegie mammalogist John Wible.*

http://medicalxpress.com/news/2011-08-commonly-antibiotic-acute-copd.html

Commonly prescribed antibiotic reduces acute COPD attacks

Adding a common antibiotic for chronic obstructive pulmonary disease (COPD) can reduce the occurrence of acute exacerbations and improve quality of life

Adding a common antibiotic to the usual daily treatment regimen for chronic obstructive pulmonary disease (COPD) can reduce the occurrence of acute exacerbations and improve quality of life, reports new results from a clinical trial funded by the National Heart, Lung, and Blood Institute (NHLBI), part of the National Institutes of Health. The study will appear in the Aug. 25 issue of the New England Journal of Medicine.

"Acute exacerbations account for a significant part of COPD's health burden," said Susan B. Shurin, M.D., acting director of the NHLBI. "These promising results with azithromycin may help us reduce that burden and

improve the lives of patients at risk." COPD exacerbations are sudden onsets of worsened cough, wheeze, and labored breathing which are typically induced by bacterial and/or viral infection. Azithromycin is already prescribed for a wide variety of bacterial infections including pneumonia and strep throat.

Previous research suggested that this antibiotic might work for COPD exacerbations, but this study was the first to enroll a large number of COPD patients and treat exacerbations with this drug over a long time. Participants had a history of exacerbations in the previous year or needed oxygen therapy.

The 570 study participants who took 250 milligrams of azithromycin daily for a year in addition to their usual care averaged 1.48 acute COPD exacerbations annually, compared to 1.83 exacerbations for the 572 participants who received their usual care without azithromycin. The participants taking azithromycin also assessed their own breathing ability and overall well-being more favorably on questionnaires.

Eighty percent of the study participants were already taking other medications normally used to manage COPD, including inhaled steroids and long-acting bronchodilators.

"This study suggests that azithromycin's benefits extend beyond those of other therapies," noted James Kiley, Ph.D., director of the NHLBI's Division of Lung Diseases. Kiley added that more research is needed to determine the long-term effects of azithromycin treatment and to identify which group of patients would benefit the most.

Side effects of azithromycin during the study were minimal. The presence of microbes resistant to azithromycin increased in some patients, although no one developed a clinically evident infection. A small fraction of participants receiving azithromycin were found to have slight hearing loss, which is a known side effect of the drug. Azithromycin can also cause heart arrhythmias in susceptible people. No heart rhythm abnormalities were seen in study patients, though people with heightened risks for arrhythmias were not enrolled in the study. *Provided by National Institutes of Health*

http://medicalxpress.com/news/2011-08-undernutrition-childhood-adolescence-young-adulthood.html

Undernutrition in childhood, adolescence or young adulthood increases risk of heart disease later

A study of women who were children, teenagers or young adults during the Dutch famine in 1944-45 has shown that undernutrition, particularly in the adolescent years, is associated with an increased risk of coronary heart disease in later life.

The research, published online today in the European Heart Journal [1], provides the first direct evidence that acute undernutrition during the time that children are growing up can have an important impact on their future health. The authors of the accompanying editorial [2] say that it underlines the importance of policy makers and health professionals taking this into account when designing and implementing disease screening and prevention programmes.

The study authors, from the University Medical Center Utrecht and the University of Amsterdam, investigated 7845 women who were aged between 0-21 and were living in The Netherlands at a time when a combination of circumstances at the end of the Second World War resulted in severe food shortages in the west of The Netherlands; official daily rations for the general adult population dropped from 1400 calories in October 1944 to between 400-800 calories at the height of the famine from December 1944 to April 1945. After six months of starvation, The Netherlands was liberated, abruptly ending the famine.

The researchers recruited the women to the study between 1993-1997 through a breast cancer screening programme, and followed them up to the end of 2007. They divided the women into three groups: 1) unexposed – women who reported being "hardly" exposed to hunger and weight loss during the famine; 2) severely exposed – women who reported being "very much" exposed to hunger and weight loss; and 3) moderately exposed – the remaining women whose famine experience was somewhere between these two experiences.

They found that, compared with unexposed women, the risk of coronary heart disease was slightly higher overall for women who had been moderately exposed to the famine, and significantly higher among those who had been severely exposed. Women who were aged between 10-17 at the start of the famine and who had been severely exposed to it, had a statistically significant 38% increased risk of coronary heart disease in later life, whereas those who had been moderately exposed had no increased risk compared with the unexposed women. After adjusting for factors that could confound the results, such as age at start of the famine, smoking, and education (as a measure of socio-economic status), there was a 27% higher risk of coronary heart disease for the severely exposed women compared to unexposed women.

In additional analyses, they found that the risk of stroke seemed to be lower for women of all ages exposed to famine compared to those who were not exposed. In particular, women who were exposed to famine as young adults (18-21 years old), and so were not exposed during a sensitive growth period, seemed to have a

lower risk of stroke compared to those who were unexposed, although this lower risk was not statistically significant.

"The Dutch famine of 1944-45 is a 'natural experiment' in history, which gave us the unique possibility to study the long-term effects of acute undernutrition during childhood, adolescence, and young adulthood in otherwise well-nourished girls and women," write the authors of the study.

They say their findings are relevant for today. "Our findings support the notion that disturbed postnatal development, particularly in adolescence, can have important implications for adult health. The contemporary relevance of our findings is that famine and undernutrition are still a major problem worldwide; the first millennium developmental goal is to eradicate extreme hunger. Since the incidence of CVD [cardiovascular disease] is the number one cause of death globally, and rising in many parts of the world, further research into the impact of undernutrition during sensitive periods of growth and maturation is warranted."

Annet van Abeelen, the first author of the study, who is a PhD epidemiology student at the Julius Center for Health Sciences and Primary Care, University Medical Center Utrecht and at the department of Clinical Epidemiology, Biostatistics and Bioinformatics, Academic Medical Center, University of Amsterdam (The Netherlands), said that more research was needed to confirm the findings and to explore the possible mechanisms underlying the effects of famine on the risk of future heart disease.

"However, our study pinpoints the crucial role childhood plays in adult health. More knowledge in this field may lead to unique opportunities for prevention in the future," she said. "According to the developmental origins of chronic disease hypothesis, as first proposed by Professor David Barker, nutritional influences early in life may change the structure and function of the body. While these changes may be beneficial for short-term survival, they may lead to chronic diseases in later years. Our study indicates that growth that has been hampered by undernutrition in later childhood, followed by a subsequent recovery, may have metabolic consequences that contribute to an increased risk of diseases later in adulthood."

For the effects of famine on coronary heart disease the authors give several possible explanations, such as unhealthy lifestyles, changes in metabolism, or traumatic stress, but they said each of these required further research. Ms van Abeelen said that more research was also needed for the findings on stroke, especially as these results were based on only 235 stroke cases.

In an accompanying editorial, Professor Kausik Ray and colleagues at St George's University of London (London, UK), write: "These results add further weight to the suggestion that adolescence is a particularly sensitive period open to epigenetic modifications and that dietary mismatch in post-famine nutritional availability contributes to coronary disease risk."

They point out that 925 million people worldwide are undernourished according to the United Nations Food and Agriculture Organization, and that in the UK a recent report by the Association of Teachers and Lecturers found that teachers reported that three-quarters of their students arrived at school hungry, with these numbers increasing since the start of the global recession.

Mentioning studies of people who starved during the Chinese famine (1959-61) and the siege of Leningrad (1941-44), Prof Ray and colleagues write: "Taken together there appear to be consistent data showing that nutritional status in childhood may impact significantly on chronic diseases processes in later life. The findings of these recent studies could have significant practical impact on immigrant populations who try to adapt to the relatively more affluent and nutritionally rich environments, particularly those escaping from man-made and natural catastrophes. For instance, first generation Asians in the UK have a higher incidence of cardiovascular disease than Caucasian counterparts. As cardiovascular disease carries the largest economic and population burden in developed countries and is fast approaching similar importance in developing countries, further work is now needed to better understand the mechanisms behind these associations and devise public health strategies which could have a significant impact on disease burden in years to come."

More information: [1] "Cardiovascular consequences of famine in the young". European Heart Journal. doi:10.1093/eurheartj/ehr228

[2] "Undernutrition in adolescence and risk of cardiovascular disease". European Heart Journal. doi:10.1093/eurheartj/ehr270 Provided by European Society of Cardiology

http://medicalxpress.com/news/2011-08-links-dha-suicide-military-personnel.html

Study links low DHA levels to suicide risk among U.S. military personnel

Medical Xpress - *A new study suggests that low levels of the highly unsaturated omega-3 essential fattyacids, in particular DHA, may be associated with increased risk of suicide.*

Researchers at the Uniformed Services University of the Health Sciences (USU) and the National Institute of Alcoholism and Alcohol Abuse (NIAAA) at the National Institutes of Health (NIH) drew this finding following analysis of a large random sampling of suicide deaths among U.S. military personnel on active-duty between

2002 and 2008. The results of this retrospective study appear in the August 23 online version of the Journal of Clinical Psychiatry.

"We were surprised to find just how low the levels of omega-3 fatty acids were in the entire sample," said Army Col. (Dr.) Michael D. Lewis, lead author on the study and assistant professor in the Department of Preventive Medicine and Biometrics at the USU. "There still was a significant suicide risk when we stratified the population. When we compared the 1,400 samples with the lowest levels of DHA to the remaining 200, there was a 62 percent increased risk that the samples were from a documented suicide. We need to continue to evaluate these results with a well-designed interventional study, but this represents a potential simple nutritional intervention that warrants further investigation."

"Our findings add to an extensive body of research that points to a fundamental role for DHA and other omega-3 fatty acids in protecting against mental health problems and suicide risks," said U.S. Public Health Service Capt. (Dr.) Joseph Hibbeln, acting chief of the Section of Nutritional Neurosciences in NIAAA's Laboratory of Membrane Biochemistry and Biophysics and corresponding author. "For example a previous placebo-controlled trial demonstrated that 2 grams of omega-3 fatty acids per day reduced suicidal thinking by 45 percent, along with depression and anxiety scores among individuals with recurrent self-harm." He adds that in a prior study they found low blood levels of DHA correlated with hyperactivity of brain regions in a pattern that closely resembles the pathology of major depression and suicide risk. Learning to Care for Those in Harm's Way Omega-3 fatty acids are essential nutrients that the body cannot make, so they must come from food sources. DHA, the major omega-3 fatty acid concentrated in the brain, is important throughout life for optimal brain development and function. Seafood is a major dietary source of omega-3 fatty acids.

Previous studies have associated low levels of omega-3 fats or low dietary intake of seafood, with suicide, thoughts of suicide, and depression. Many, but not all, treatment studies also have reported mental health benefits of supplemental DHA, including reduced anxiety, depression and risk of psychosis.

More information: The paper is available at http://dx.doi.org/ ... JCP.11m06879

http://www.eurekalert.org/pub_releases/2011-08/bmj-vas082411.php

Vitamin A supplements for children could save 600,000 lives a year

Children in low and middle income countries should be given vitamin A supplements to prevent death and illness, concludes a study published on bmj.com today.

The researchers argue that the effectiveness of vitamin A supplementation is now so well-established that further trials would be unethical, and they urge policymakers to provide supplements for all children at risk of deficiency.

Vitamin A is an essential nutrient that must be obtained through diet. Vitamin A deficiency in children increases vulnerability to infections like diarrhoea and measles and may also lead to blindness. Globally, the World Health Organisation estimates that 190 million children under the age of 5 may be vitamin A deficient. But, despite widespread efforts, vitamin A programmes do not reach all children who could benefit.

So a team of researchers based in the UK and Pakistan analysed the results of 43 trials of vitamin A supplementation involving over 200,000 children aged 6 months to 5 years. Differences in study design and quality were taken into account to minimise bias.

They found vitamin A supplements reduced child mortality by 24% in low and middle income countries. It may also reduce mortality and disability by preventing measles, diarrhoea and vision problems, including night blindness.

The authors say that, if the risk of death for 190 million vitamin A deficient children were reduced by 24%, over 600,000 lives would be saved each year and 20 million disability-adjusted life years (a measure of quantity and quality of life) would be gained.

Based on these results, the authors strongly recommend supplementation for children under 5 in areas at risk of vitamin A deficiency. They conclude: "The evidence for vitamin A is compelling and clear. Further trials comparing vitamin A with placebo would be unethical."

This view is supported in an accompanying editorial by two experts at Harvard School of Public Health, who say "effort should now focus on finding ways to sustain this important child survival initiative and fine tune it to maximise the number of lives saved."

http://www.eurekalert.org/pub_releases/2011-08/sumc-cwc082311.php

Canoodling with cavemen gave healthy boost to human genome, Stanford study finds

STANFORD, Calif. - ***For a few years now, scientists have known that humans and their evolutionary cousins had some casual flings, but now it appears that these liaisons led to a more meaningful relationship.***

Sex with Neanderthals and another close relative - the recently discovered Denisovans - has endowed some human gene pools with beneficial versions of immune system genes, report researchers at the Stanford University School of Medicine in an article to be published online by the journal Science at the Science Express website on August 25.

Although modern humans, Neanderthals and Denisovans share a common ancestor in Africa, the groups split into separate, distinct populations approximately 400,000 years ago. The Neanderthal lineage migrated northwestward into West Asia and Europe, and the Denisovan lineage moved northeastward into East Asia. The ancestors of modern man stayed in Africa until 65,000 years or so ago, when they expanded into Eurasia and then encountered the other human-like groups. In some cases, the rendezvous were amorous in nature.

Last year, a partial genome sequence of Neanderthals, who died out approximately 30,000 years ago, revealed that these trysts left as much as 4 percent Neanderthal DNA in the genetic blueprint of some present-day humans. Last December, the genome of another human cousin, the extinct Denisovans, made clear that up to 6 percent of some people's genomes are Denisovan in origin.

Now, a team of researchers led by Peter Parham, PhD, professor of structural biology and of microbiology and immunology, has found that these matings had a positive effect on modern human fitness. "The cross breeding wasn't just a random event that happened, it gave something useful to the gene pool of the modern human," said Parham, who is senior author on the study.

The useful gift was the introduction of new variants of immune system genes called the HLA class I genes, which are critical for our body's ability to recognize and destroy pathogens. HLA genes are some of the most variable and adaptable genes in our genome, in part because the rapid evolution of viruses demands flexibility on the part of our immune system.

"The HLA gene system, with its diversity of variants, is like a magnifying glass," said lead author Laurent Abi-Rached, PhD, explaining that it provides a lot more detail about the history of populations than typical gene families. Abi-Rached is a research associate in the Parham lab.

Prior to the sequencing of the Neanderthal and Denisovan genomes, Parham and his group had suspected that at least one HLA variant came from archaic humans. They determined that the variant known as HLA-B*73 is rare in present-day African populations but occurs with significant frequency in West Asian populations. The ethnic distribution of HLA-B*73 and its similarity across populations suggested that it came from a relatively recent co-mingling of modern human and archaic human DNA, which most likely would have happened outside of Africa. Parham's team wanted to discern which archaic humans were the source of the HLA-B*73 gene type. In the last year they have found the answer in the genome sequence of a recently discovered human relative, the Denisovans, whose existence first came to light in 2008 with the discovery of an unfamiliar finger bone and tooth in a cave in Siberia.

By comparing the HLA genes of the archaic humans with modern humans, the researchers were able to show that the HLA-B*73 allele likely came from cross breeding with Denisovans. Little is known about what the Denisovans looked like (the finger bone and the tooth are the only known fossils), but the genome sequence extracted from the finger bone gives insight into where they overlapped with modern humans. Gene flow from the Denisovans into modern humans has left the highest frequency of the HLA-B*73 allele in populations in West Asia, the most likely site for the fortuitous mating to have taken place.

Even in West Asian populations, the HLA-B*73 variant never represents more than 5 percent of all known variants of that gene. However, other human HLA types that arose from ancient matings are found in much greater frequencies. "Certain traits coming from these archaic humans have become the dominant form," said Parham. For example, another HLA gene type, called HLA-A*11, is absent from African populations, but represents up to 64 percent of variants in East Asia and Oceania, with the greatest frequency in people from Papua New Guinea. "The likely interpretation was that these HLA class variants provided an advantage to modern human and so rose to high frequencies," Parham said.

A similar scenario is seen in some HLA gene types found in the Neanderthal genome, which was also sequenced from DNA extracted from ancient bones. These gene variants are common in European and Asian populations but rare in African populations. "We are finding frequencies in Asia and Europe that are far greater than whole genome estimates of archaic DNA in modern human genomes, which is 1 to 6 percent," said Parham. Within one class of HLA gene, the researchers estimate that Europeans owe half of their variants to

interbreeding with Neanderthals and Denisovans, Asians owe up to 80 percent and Papua New Guineans, up to 95 percent.

"This is not the pattern seen genome-wide," said Abi-Rached. "The HLA system is unique in its diversity and the strength of natural selection acting on it, but it's possible that other gene systems, particularly the ones under similar pressure for variation, could show a similar pattern."

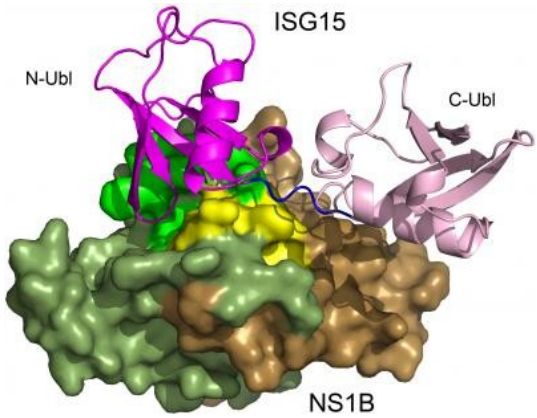
Other Stanford-affiliated authors include Matthew Jobin, PhD, lecturer in the Department of Anthropology; postdoctoral scholar Subhash Kulkarni, PhD; research assistant Farbod Babrzadeh; visiting scholar Baback Gharizadeh, PhD; and research associates Lisbeth Guethlein, PhD, and Paul Norman, PhD. The Stanford researchers collaborated with colleagues at the Royal Free Hospital, in the United Kingdom; Ankara University, in Turkey; the National Marrow Donor Program, in Minneapolis; the University of Manitoba; the University of Nairobi; the National Cancer Institute; Liverpool University; UCLA; Canadian Blood Services; and UC-Santa Cruz.

The study was funded by National Institutes of Health, the Yerkes Center, the National Science Foundation and the National Cancer Institute.

http://www.eurekalert.org/pub_releases/2011-08/ru-dew082511.php

Discovery explains why influenza B virus exclusively infects humans; opens door for drug development

Rutgers, University of Texas at Austin researchers determine 3-D structure of site on influenza B virus protein that suppresses human defenses to infection



Researchers at Rutgers University and the University of Texas at Austin have reported a discovery that could help scientists develop drugs to fight seasonal influenza epidemics caused by the common influenza B strain.

Their discovery also helps explain how influenza B is limited to humans, and why it cannot be as virulent as A strains that incorporate new genes from influenza viruses that infect other species. The devastating flu pandemic of 1918, the pandemics of 1968 and 1977, and the avian influenza that emerged in the middle of the last decade were caused by influenza A viruses. Understanding features of influenza B virus that limit it to humans will help scientists better understand how influenza A strains are able to cross species.

Three-dimensional structure of a complex between influenza B virus protein, NS1B, is represented as the solid form, and the human protein that fights infections, ISG15, is represented as pink and magenta ribbons and strands. The sequence of the ISG15 protein found only in humans and non-human primates, represented as a short dark blue strand, binds to the NS1B protein, immobilizing ISG15 and preventing it from fighting the virus. Researchers determined the structure using X-ray crystallography. **Rongjin Guan, et. al., Rutgers and University of Texas at Austin**

The researchers have determined the three-dimensional structure of a complex between an influenza B virus protein and one of its human protein targets, resulting in suppression of the cell's natural defenses to the infection and paving the way for the virus to replicate efficiently.

Their findings are detailed in a paper published in the most recent issue of PNAS (Proceedings of the National Academy of Sciences).

"Our study shows the basis by which non-structural protein 1 of influenza B, or NS1B, binds to a human host protein, immobilizing it to prevent it from fighting the virus," said Gaetano Montelione, a lead author and professor of biochemistry and molecular biology, School of Arts and Sciences, at Rutgers. That human protein, known as interferon-stimulated gene 15 protein or ISG15, is an essential part of the defense mechanism that human cells use to protect themselves from viral infections. Chemicals that block the binding of NS1B to ISG15 may have antiviral potential against influenza B virus.

The study, led by professors Montelione and Robert Krug at the University of Texas at Austin, also reveals why NS1B cannot bind ISG15 molecules in other species, such as dogs or mice. Only human and non-human primate ISG15 proteins have a unique molecular sequence in a small part of the protein that makes it possible to bind to the NS1B protein. So far, influenza B virus has been found only in humans.

"The three-dimensional structure of the NS1B-ISG15 complex, which we determined using X-ray crystallography, has given us a clear understanding of the molecular basis for this species specificity," said Krug, professor and chair of molecular genetics and microbiology.

"Flu infections continue to be a major health problem, with more effective drugs critically needed to treat infected individuals and control potential pandemics," said Aaron Shatkin, director of the Center for Advanced Biotechnology and Medicine (CABM) at Rutgers and an eminent virologist. "This discovery opens new possibilities for achieving these very important goals."

Participating in the study from Rutgers were Rongjin Guan, Li-Ching Ma and Brendan Amer, who along with Montelione are members of CABM and the Northeast Structural Genomics Consortium. They were joined by Paul Leonard of the Robert Wood Johnson Medical School, University of Medicine and Dentistry of New Jersey, who is also a member of CABM and the Howard Hughes Medical Institute. Participating from the University of Texas at Austin were Haripriya Sridharan and Chen Zhao, who along with Krug are also members of the university's Institute for Cellular and Molecular Biology.
Montelione is the Jerome and Lorraine Aresty Chair in Cancer Research at Rutgers, an endowed chair established to support Montelione's research efforts in the general area of cancer biology research. Significantly, some of the human proteins that are targets of the influenza virus's defense mechanisms, like ISG15, are also important in cancer biology. Krug is a Fellow of the Mr. And Mrs. Corbin J. Robertson, Sr. Regents Chair in Molecular Biology at the University of Texas at Austin.
The work was supported by grants from the Protein Structure Initiative (PSI-Biology) Program of the National Institutes of Health and its National Institute of General Medical Sciences, the National Institute of Allergy and Infectious Disease, and the Howard Hughes Medical Institute.

http://www.eurekalert.org/pub_releases/2011-08/tju-svt082511.php

Single vaccines to protect against both rabies and Ebola

Partnering with the NIH, Thomas Jefferson University successfully tests a vaccine in mice that could lead to a more effective public health tool in Africa

PHILADELPHIA - Researchers from Thomas Jefferson University, among other institutions, including the National Institute of Allergy and Infectious Diseases, have developed single vaccines to protect against both rabies and the Ebola virus. Successfully tested in mice, these bivalent vaccines have several advantages over other Ebola candidates that could help speed up development for use in humans and primates. It's built on the same platform as the already approved and financially viable rabies vaccine, and it protects at-risk populations against two viruses, not just one, making it an effective and ideal public health tool.

"Many Ebola vaccine candidates have been proven effective, but none are close to licensure," said Matthias Schnell, Ph.D., director of the Jefferson Vaccine Center. "One of the challenges is the market: There's rather limited incentive in creating a vaccine for Ebola. But these vaccines could change that."

The findings were published ahead of print online August 17 in the Journal of Virology.

The Ebola virus belongs to the Filoviridae family and is comprised of five distinct species. The Zaïre, Sudan and Bundibugyo species have been associated with large Ebola hemorrhagic fever outbreaks in Africa. According to the World Health Organization, more than a thousand people have died from the virus since it was discovered in 1976.

"Rabies still poses a health threat for people worldwide, and is especially devastating in developing nations where a post exposure treatment is often not available. And Ebola still exists in parts of Central Africa and is also a chief bioterrorism concern worldwide," said Dr. Schnell, who is also a Professor in the Department of Microbiology and Immunology at Thomas Jefferson University. "You can protect these people from two very lethal diseases in an area where they don't have the best access to medical care."

The purpose of this study was to identify novel vaccine candidates for Ebola with a maximum potential of licensure and utilization. Researchers generated a chemically inactivated and live rabies virus expressing the Ebola Zaïre species glycoprotein using a reverse genetics system based on the commonly-used rabies vaccine. Immunizations with those vaccines, the researchers found, induced immunity against each virus and conferred protection from both viruses in mice.

Piggy backing, in a sense, on the rabies vaccine could accelerate development of vaccines that protects against Ebola because of the advanced state of the rabies vaccine's safety, production and distribution, according to Schnell. "After the vaccine has been tested in primates and eventually humans, this new vaccine could kill the proverbially two birds with one stone," he said.

There are implications for nonhumans, too - gorillas, in particular. The Ebola virus has eradicated thousands of gorillas, prompting the World Conservation Union to raise their status to "critically endangered" in 2007, the first time a mammal has become critically endangered as a direct result of disease. Vaccinations, though challenging, could stall those deaths. What's more, several human outbreaks have been attributed to primate interaction or handling, so providing a vaccine for our closest relative could minimize that risk.

http://www.eurekalert.org/pub_releases/2011-08/uoc-tmm082511.php

The malaria mosquito is disappearing - but it is not just good news

The incidence of malaria in many African countries south of the Sahara is falling rapidly.

A Danish-Tanzanian research group has discovered that the mosquito carrying the malaria parasite has practically disappeared from villages without organized mosquito control, and the researchers do not know why. There are several hypotheses but without proper data they cannot say whether malaria is being eradicated or whether it is just resting up before returning with renewed vigour.

"Many of our fellow malaria researchers think that the fall in countries such as Tanzania, Eritrea, Rwanda, Kenya and Zambia shows that all the control programmes are working, particularly the use of mosquito nets," says Associate Professor Dan Meyrowitsch from the Department of Health Services Research at the University of Copenhagen, and continues:

"That just isn't the whole story. For more than ten years we have been collecting and counting the number of mosquitoes in Tanzanian villages. The number in our traps fell from 5300 in 2004 to just 14 in 2009, and these were from villages without mosquito nets."

Dan Meyrowitsch explains that the 99 % fall in the malaria mosquito population during the end of the 1990s seems to be connected to a fall in precipitation. This may be due to global climate changes. "From 2003 to 2009 the volume of precipitation was more stable, but the rain was more chaotic and fell outside the rainy season. And this may have disturbed the natural cycle of mosquito development," he says. "Of course it is great that the number of malaria-related fatalities among children has fallen drastically in the last five or six years, but we need to know why!"

Since the researchers can discount mosquito nets, the question is whether the mosquitoes have succumbed to disease, or communities have been using pesticides, or whether the fall is due to the chaotic new precipitation patterns. "Unless we find the answer we will not be able to predict when the malaria mosquitoes will come back, and that could rapidly prove critical," Dan Meyrowitsch explains.

Many children and adults have not been exposed to malaria in the last five or six years, and so have lost or failed to develop immunity to the parasite. When the mosquitoes suddenly come back this may mean dramatic malaria epidemics with many fatalities unless the population and the health authorities are ready for them.

The Danish research group comes from three departments at the University of Copenhagen: the Department of International Health, Immunology and Microbiology, the Department of Public Health, and the Department of Veterinary Disease Biology. The study is funded by the EU, DBL - Center for Health Research and Development, and The Consultative Research Committee for Development Research, Ministry of Foreign Affairs, Denmark. It was conducted in close cooperation with researchers from the National Institute for Medical Research in Tanzania.

The study: Is the current decline in malaria burden in sub-Saharan Africa due to a decrease in vector population? is published in Malaria Journal.

http://www.scientificamerican.com/article.cfm?id=cloud-formation-may-be-linked-to-cosmic-rays

Cloud Formation May Be Linked to Cosmic Rays

Experiment probes connection between climate change and radiation bombarding the atmosphere.

By Geoff Brumfiel and Nature magazine | Thursday, August 25, 2011 | 14

It sounds like a conspiracy theory: 'cosmic rays' from deep space might be creating clouds in Earth's atmosphere and changing the climate. Yet an experiment at CERN, Europe's high-energy physics laboratory near Geneva, Switzerland, is finding tentative evidence for just that.

The findings, published today in Nature, are preliminary, but they are stoking a long-running argument over the role of radiation from distant stars in altering the climate.

For a century, scientists have known that charged particles from space constantly bombard Earth. Known as cosmic rays, the particles are mostly protons blasted out of supernovae. As the protons crash through the planet's atmosphere, they can ionize volatile compounds, causing them to condense into airborne droplets, or aerosols. Clouds might then build up around the droplets.

The number of cosmic rays that reach Earth depends on the Sun. When the Sun is emitting lots of radiation, its magnetic field shields the planet from cosmic rays. During periods of low solar activity, more cosmic rays reach Earth.

Scientists agree on these basic facts, but there is far less agreement on whether cosmic rays can have a large role in cloud formation and climate change. Since the late 1990s, some have suggested that when high solar activity lowers levels of cosmic rays, that in turn reduces cloud cover and warms the planet. Others say that there is no statistical evidence for such an effect.

Polarizing lens

"People are far too polarized, and in my opinion there are huge, important areas where our understanding is poor at the moment," says Jasper Kirkby, a physicist at CERN. In particular, he says, little controlled research has been done on exactly what effect cosmic rays can have on atmospheric chemistry.

To find out, Kirkby and his team are bringing the atmosphere down to Earth in an experiment called Cosmics Leaving Outdoor Droplets (CLOUD). The team fills a custom-built chamber with ultrapure air and chemicals believed to seed clouds: water vapour, sulphur dioxide, ozone and ammonia. They then bombard the chamber with protons from the same accelerator that feeds the Large Hadron Collider, the world's most

powerful particle smasher. As the synthetic cosmic rays stream in, the group carefully samples the artificial atmosphere to see what effect the rays are having.

Early results seem to indicate that cosmic rays do cause a change. The high-energy protons seemed to enhance the production of nanometre-sized particles from the gaseous atmosphere by more than a factor of ten. But, Kirkby adds, those particles are far too small to serve as seeds for clouds. "At the moment, it actually says nothing about a possible cosmic-ray effect on clouds and climate, but it's a very important first step," he says.

Scientists on both sides of the debate welcome the findings, although they draw differing conclusions. "Of course there are many things to explore, but I think the cosmic-ray/cloud-seeding hypothesis is converging with reality," says Henrik Svensmark, a physicist at the Technical University of Denmark in Copenhagen, who claims a link between climate change and cosmic rays.

Others disagree. The CLOUD experiment is "not firming up the connection", counters Mike Lockwood, a space and environmental physicist at the University of Reading, UK, who is sceptical. Lockwood says that the small particles may not grow fast enough or large enough to be important in comparison with other cloud-forming processes in the atmosphere.

"I think it's an incredibly worthwhile and overdue experiment," says Piers Forster, a climatologist at the University of Leeds, UK, who studied the link between cosmic rays and climate for the latest scientific assessment by the International Panel on Climate Change. But for now at least, he says that the experiment "probably raises more questions than it answers".

Kirkby hopes that the experiment will eventually answer the cosmic-ray question. In the coming years, he says, his group is planning experiments with larger particles in the chamber, and they hope eventually to generate artificial clouds for study. "There is a series of measurements that we will have to do that will take at least five years," he says. "But at the end of it, we want to settle it one way or the other."

http://www.physorg.com/news/2011-08-earth-bound-asteroids-stony.html

Earth-bound asteroids come from stony asteroids, new studies confirm

Researchers got their first up-close look at dust from the surface of a small, stony asteroid after the Hayabusa spacecraft scooped some up and brought it back to Earth.

Analysis of these dust particles, detailed in a special issue of the journal Science this week, confirms a long-standing suspicion: that the most common meteorites found here on Earth, known as ordinary chondrites, are born from these stony, or S-type, asteroids. And since chondrites are among the most primitive objects in the solar system, the discovery also means that these asteroids have been recording a long and rich history of early solar system events.

The 26 August issue of Science includes six reports and a Perspective article that highlight the initial studies of this asteroid dust.

The Hayabusa spacecraft was launched by the Japan Aerospace Exploration Agency (JAXA) in 2003 to sample the surface of the near-Earth asteroid known as 25143 Itokawa. The unmanned vessel reached its destination a little more than two years later - and in November 2005, it made two separate touchdowns on the surface of Itokawa. Although its primary sampler malfunctioned, the spacecraft was able to strike the asteroid's surface with an elastic sampling horn and catch the small amount of dust particles that were kicked up. After reentering Earth's atmosphere and landing in South Australia in June 2010, Hayabusa's delicate samples were analyzed extensively by various teams of researchers.

"Science is very excited and pleased to be presenting these important scientific analyses," said Brooks Hanson, Deputy Editor of the Physical Sciences. "The first samples that researchers collected beyond Earth were from the moon, and the first analyses of those samples were also published in Science. Those samples, along with the more recent sampling of a comet and the solar wind, have changed our understanding of the solar system and Earth. They are still yielding important results. These Hayabusa samples are the first samples of an asteroid. Not only do they provide important information about the history of the asteroid Itokawa, but by providing the needed ground truth that is only possible through direct sampling, they also help make other important samples - like meteorite collections and the lunar samples - even more useful."

The asteroid sampled by Hayabusa is a rocky, S-type asteroid with the appearance of a rubble pile. Based on observations from the ground, researchers have believed that similar S-type asteroids, generally located in our solar system's inner and middle asteroid belt, are responsible for most of the small meteorites that regularly strike Earth. But, the visible spectra of these asteroids have never precisely matched those of ordinary chondrites - a fact that has left researchers suspicious of their actual affiliation. The only way to confirm a

direct relationship between meteorites and these S-type asteroids was to physically sample the regolith from an asteroid's surface.

Tomoki Nakamura from Tohoku University in Sendai, Japan and colleagues from across the country and in the United States were among the first to analyze this regolith brought back by Hayabusa. The team of researchers used a combination of powerful electron microscopes and X-ray diffraction techniques to study the mineral chemistry of Itokawa's dust particles.

"Our study demonstrates that the rocky particles recovered from the S-type asteroid are identical to ordinary chondrites, which proves that asteroids are indeed very primitive solar system bodies," said Nakamura.

The researchers also noticed that Itokawa's regolith has gone through significant heating and impact shocks. Based on its size, they conclude that the asteroid is actually made up of small fragments of a much bigger asteroid.

"The particles recovered from the asteroid have experienced long-term heating at about 800 degrees Celsius," said Nakamura. "But, to reach 800 degrees, an asteroid would need to be about 12.4 miles (20 kilometers) in diameter. The current size of Itokawa is much smaller than that so it must have first formed as a larger body, then been broken by an impact event and reassembled in its current form."

Separate teams of researchers, including Mitsuru Ebihara from Tokyo Metropolitan University and colleagues from the United States and Australia, cut open the tiny regolith grains returned by Hayabusa to get a look at the minerals inside them. Their composition shows that the dust grains have preserved a record of primitive elements from the early solar system. Now, those mineral compositions can be compared to tens of thousands of meteorites that have fallen to Earth, and then correlated to the visible spectra of other asteroids in space.

Akira Tsuchiyama from Osaka University in Toyonaka, Japan and colleagues from around the world also analyzed the three-dimensional structures of the dust particles. Since dust from the surface of the moon is the only other type of extraterrestrial regolith that researchers have been able to sample directly (from the Apollo and Luna missions), these researchers closely compared the two types.

"The cool thing about this Itokawa analysis is the tremendous amount of data we can get from such a small sample," said Michael Zolensky from the NASA Johnson Space Center in Houston, Texas, a co-author of the research. "When researchers analyzed regolith from the moon, they needed kilogram-sized samples. But, for the past 40 years, experts have been developing technologies to analyze extremely small samples. Now, we've gained all this information about Itokawa with only a few nano-grams of dust from the asteroid."

According to the researchers, Itokawa's regolith has been shaped by erosion and surface impacts on the asteroid, whereas lunar regolith, which has spent more time exposed to solar winds and space weathering, has been more chemically altered.

Takaaki Noguchi from Ibaraki University in Mito, Japan, and colleagues cite this chemical difference between the lunar dust and the Itokawa samples as one of the reasons astronomers have never been able to definitively tie ordinary chondrites to S-type asteroids in the past.

"Space weathering is the interaction between the surface of airless bodies, like asteroids and the moon, and the energetic particles in space," said Noguchi. "When these energetic particles - like solar wind, plasma ejected from the Sun and fast-traveling micrometeoroids - strike an object, pieces of them condense on the surface of that object. In the vacuum of space, such deposits can create small iron particles that greatly affect the visible spectra of these celestial bodies when they are viewed from Earth."

But now, instead of using lunar samples to estimate the space weathering on an asteroid in the future, researchers can turn to the asteroid regolith for direct insight into such processes.

Two more international studies led by Keisuke Nagao from the University of Tokyo and Hisayoshi Yurimoto from Hokkaido University in Sapporo, Japan, respectively, have determined how long the regolith material has been on the surface of Itokawa and established a direct link between the oxygen isotopes in ordinary chondrites and their parent, S-type asteroids.

According to the researchers, the dust from Itokawa has been on the surface of the asteroid for less than eight million years. They suggest that regolith material from such small asteroids might escape easily into space to become meteorites, traveling toward Earth.

"This dust from the surface of the Itokawa asteroid will become a sort of Rosetta Stone for astronomers to use," according to Zolensky. "Now that we understand the bulk mineral and chemical composition of the Hayabusa sample, we can compare them to meteorites that have struck the Earth and try to determine which asteroids the chondrites came from." *Provided by American Association for the Advancement of Science*

http://www.eurekalert.org/pub_releases/2011-08/uoc-hah082611.php

Herbal abortion helps African women

Researchers at the Faculty of Pharmaceutical Sciences, University of Copenhagen, have examined a number of plants which are used for illegal abortions in Tanzania.

The lab tests show that several of the plants can make the uterus tissue contract and that the plants therefore can be used to stop lethal bleedings after birth. This new knowledge is now to be conveyed in rural Tanzania where access to medicine often is difficult.

Every year around 350,000 women die globally due to post partum bleedings - blood loss during child birth. On the African continent, one in 16 women die during their pregnancy and in some countries the number is as high as every eighth woman. The reason is poor access to medical assistance often because the women either lack money or because they live to far away. The knowledge about herbs, which can help the uterus contract after childbirth is therefore often the only life saving opportunity in remote rural areas.

Danish researchers have therefore tested 22 abort inducing plants in the lab on rat tissue, and several of the plants had close to the same effect as the control drug acetylcholin.

"Half of the plants we tested made the uterus tissue contract strongly whereas 11 of the extracts induced contractions with short intervals. Seven of the plants worked in both ways," explains Associate Professor Anna K. Jäger from the Department of Medicinal Chemistry at the University of Copenhagen.

Anna K. Jäger is Ethno Pharmacologist, which means her research is founded in the meeting with different cultures' traditional healers and she investigates whether the traditional medicine contains active drugs that have a proved effect on diseases.

These research results will now be used for health promotion in Africa, and for this the researchers are planning a series of information seminars in the organizations of traditional healers and birth attendants in Tanzania. In Tanzania abortion is illegal and this brings the pregnant women to the traditional healers.

Through interviews with local birth attendants, the Danish doctor Vibeke Rasch from Odense University Hospital has learned about 22 plants, which are used by women who do not have access to abortion in the hospitals. Two of the collected African plants are placed in the vagina and the others are taken as a tea or a plant extract.

With the project People and Plant Medicine, researchers investigate whether the plants used in traditional medicine has pharmacological effects making the plants suitable for medicine. It is important to identify the plants which work, but also to sort out the ineffective and harmful plants. The goal of the project is to share this knowledge with the practitioners and users of plant medicine in as many local African societies as possible.

The laboratory work is done in collaboration with Associate Professor Uffe Kristiansen from the Department of Pharmacology and Pharmacotherapy.

http://www.physorg.com/news/2011-08-people-biased-creative-ideas.html

People are biased against creative ideas, studies find

The next time your great idea at work elicits silence or eye rolls, you might just pity those co-workers. Fresh research indicates they don't even know what a creative idea looks like and that creativity, hailed as a positive change agent, actually makes people squirm.

"How is it that people say they want creativity but in reality often reject it?" said Jack Goncalo, ILR School assistant professor of organizational behavior and co-author of research to be published in an upcoming issue of the journal Psychological Science. The paper reports on two 2010 experiments at the University of Pennsylvania involving more than 200 people.

The studies' findings include:

Creative ideas are by definition novel, and novelty can trigger feelings of uncertainty that make most people uncomfortable.

People dismiss creative ideas in favor of ideas that are purely practical - tried and true.

Objective evidence shoring up the validity of a creative proposal does not motivate people to accept it.

Anti-creativity bias is so subtle that people are unaware of it, which can interfere with their ability to recognize a creative idea.

For example, subjects had a negative reaction to a running shoe equipped with nanotechnology that adjusted fabric thickness to cool the foot and reduce blisters.

To uncover bias against creativity, the researchers used a subtle technique to measure unconscious bias - the kind to which people may not want to admit, such as racism. Results revealed that while people explicitly claimed to desire creative ideas, they actually associated creative ideas with negative words such as "vomit," "poison" and "agony."

Goncalo said this bias caused subjects to reject ideas for new products that were novel and high quality.

"Our findings imply a deep irony," wrote the authors, who also included Jennifer Mueller of the University of Pennsylvania and Shimul Melwani of the University of North Carolina, Chapel Hill.

Uncertainty drives the search for and generation of creative ideas, but "uncertainty also makes us less able to recognize creativity, perhaps when we need it most," the researchers wrote. "Revealing the existence and nature of a bias against creativity can help explain why people might reject creative ideas and stifle scientific advancements, even in the face of strong intentions to the contrary. ... The field of creativity may need to shift its current focus from identifying how to generate more creative ideas to identify how to help innovative institutions recognize and accept creativity."

The study, "The Bias Against Creativity: Why People Desire But Reject Creative Ideas," might validate the frustrations of creative people, Goncalo said. *Provided by Cornell University*

http://medicalxpress.com/news/2011-08-doodling-science.html

Drawing and doodling can help you learn science: study

Medical Xpress - *According to a new study students should be encouraged to use freehand drawings in science class because it will help them learn more quickly.*

The researchers, Associate Professor Shaaron Ainsworth of the University of Nottingham's School of Psychology, and colleagues from La Trobe and Deakin Universities in Australia, report that freehand drawing can inspire students to learn and retain information, and can help them engage with the educational materials, when they might not pay attention otherwise. Freehand drawing or doodling can also help them later to recall and communicate what they have learned.

Drawing may be particularly useful for science students, since science often uses visual aids such as graphs, drawings, videos and still images to explain hypotheses, theories, and findings, but Dr Ainsworth stressed that drawing should complement other activities such as writing and talking, rather than replacing them. She also said that drawing should be a key component and should enhance creativity rather than being a mere "coloring in" activity. Dr Ainsworth said science students applied more effort to learning when they read and then drew pictures of their understanding of the text. The amount of enjoyment they derived from the activity was "striking," when compared to just reading or from reading and then writing summaries.

The researchers suggested that drawing should be regarded as a valuable element in science education, along with reading, writing, and verbal discussions. The scientists also suggest that if students were allowed to draw when exploring science they could become more motivated to learn than if they are required to learn by rote, as is often currently the case. Students also tend to enjoy their learning activities more than if they are asked to remain passive recipients of their education.

Informal science education opportunities are often represented as merely being "fun," but the research suggests these activities might be undervalued, and that activities that seem like play can actually stimulate the interests of students and be used by them to explore their scientific interests. Stimulating an interest in science is important if students are to be motivated to engage in scientific research over the long term.

The new study, reported in an article in the journal Science adds to research reported in 2009 in Applied Cognitive Psychology, which found that college students who doodled during routine tasks had improved memory recall over those who did not. The research suggested that doodling prevented the students from daydreaming, which would have distracted them from the task at hand.

More information: Drawing to Learn in Science, Science 26 August 2011: Vol. 333 no. 6046 pp. 1096-1097. DOI: 10.1126/science.1204153

Abstract

Should science learners be challenged to draw more? Certainly making visualizations is integral to scientific thinking. Scientists do not use words only but rely on diagrams, graphs, videos, photographs, and other images to make discoveries, explain findings, and excite public interest. From the notebooks of Faraday and Maxwell (1) to current professional practices of chemists (2), scientists imagine new relations, test ideas, and elaborate knowledge through visual representations (3–5).

http://medicalxpress.com/news/2011-08-patients-urged.html

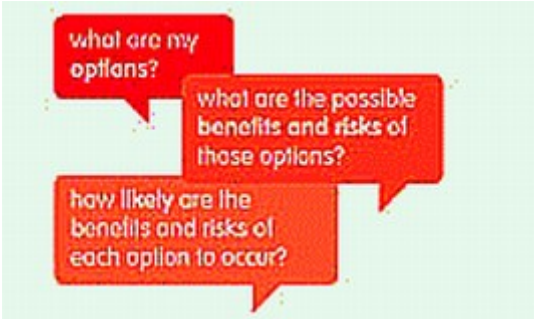
Ask 3 questions, patients urged

Asking three simple questions could help patients have more say and better understand their treatment options, according to University research.

Researchers from the University's School of Medicine's Department of Primary Care and Public Health have been working alongside doctors and nurses from Cardiff and the Vale University Health Board to develop tools to get the public more involved in deciding how they are treated.

By encouraging patients to ask three simple questions: What are my options? What are the possible benefits and risks of those options? How likely are the benefits and risks of each option to occur? the researchers hope to improve patient knowledge and encourage engagement with health staff to develop more tailored treatment.

The work is based on research that shows shared decision making can lead to better outcomes for patients. The Making Good Decisions in Collaboration (MAGIC) programme, funded by the Health Foundation, is a joint venture between Cardiff School of Medicine, Newcastle University, Cardiff and Vale University Health Board and Newcastle-upon-Tyne Hospitals NHS Foundation Trust.



The 18-month programme, joint led by Professor Glyn Elwyn, School of Medicine, aims to explore how clinicians can engage patients in shared decision making and how it can be embedded into mainstream health services.

Keith Cass, who was diagnosed with prostate cancer, has been using the 3 Questions during his treatment and played a part in developing the tools. Mr. Cass said: "I'm really pleased with the way it is going ahead and the number of patients that have been involved. We do feel we are part of the decision making team.

"It is us that are ill and we want to have some control at least over the decisions about our health and treatments. I think these tools will definitely be helpful.

"Patients are asking questions that they wouldn't have asked before. I've made decisions about my treatment that have been based on my quality of life. I think the MAGIC Project helped me make those decisions. It's helped me become I'm more aware of my illness. There's massive benefit for patients."

Shared decision making is known to work well in situations where there is more than one reasonable course of action.

Patients are often faced with difficult decisions to make, whether it's about choosing to have treatment or choosing between different treatment options. The best decision for the patient will depend on what matters most to them. In order to think about what's important, they need to know about the full range of options available and the likelihood of different outcomes happening - the three questions can help support this.

Professor Elwyn, School of Medicine, said: "Many good decision support tools exist already, but aren't widely used. We want to raise awareness of shared decision making and find ways to introduce sustainable change that can be easily replicated in other areas."

More information: *More information on the Ask 3 Questions campaign is available at: http://www.cardiff nhs.uk/ask3*
Provided by Cardiff University

http://www.scientificamerican.com/article.cfm?id=japan-aims-to-halve-radiation

Japan Aims to Halve Radiation in Affected Areas in 2 Years

Japan aims to halve radiation over two years in places contaminated by the Fukushima nuclear crisis, removing soil, plants and trees as well as cleaning roofs of buildings in an area spanning thousands of square kilometers.

By Shinichi Saoshiro

TOKYO (Reuters) - Japan aims to halve radiation over two years in places contaminated by the Fukushima nuclear crisis, removing soil, plants and trees as well as cleaning roofs of buildings in an area spanning thousands of square kilometers. The cleanup could cost tens of billions of dollars, and thousands of evacuees may not be able to return home for years, if ever.

Radiation in a contaminated area is estimated to fall naturally by about 40 percent over two years, and the government wants to speed up the process by another 10 percent through human efforts, according to guidelines for the cleanup unveiled on Friday.

"We aim to reduce radiation levels by half over the next two years in affected areas, and by 60 percent over the same period for places used by children," nuclear crisis minister Goshi Hosono told a news conference.

Another key government goal is to bring radiation below 20 millisieverts per year, the threshold level for evacuation, in areas where it is exceeded. Some places in the evacuation zone have levels that far surpass this, government data showed this week. "Ultimately we want to achieve this goal in a shorter period. Technology is continuing to advance and with enough government funding and effort it can be done," Hosono said.

Japan has banned people from entering within a 20 km (12 mile) radius of the Fukushima Daiichi plant, which had its reactor cooling systems knocked out by the March 11 earthquake and tsunami, triggering meltdowns and a radiation crisis. Some 80,000 people have been evacuated from the area around the plant.

The guideline also calls for thorough cleanups in places frequented by children such as schools and parks, eventually pushing radiation levels in those places below 1 millisievert annually.

The total area in need of cleanup could be 1,000-4,000 square km (386-1,544 square miles), about 0.3 to 1 percent of Japan's total land area, and cost several trillion yen to more than 10 trillion yen ($130 billion), experts say. One major problem the government faces is that removal of farmland topsoil could ruin fertile agricultural areas, and it plans to come up with guidelines to address this problem next month.

The government said it will take full responsibility for the soil and debris removed in the cleanup, but that as yet it does not have a permanent solution for storing the radioactive material and it would have to be kept within local communities for the time being.

"I reiterate that Fukushima prefecture will not become the final place of treatment for the debris," Hosono said.

NUCLEAR WATCHDOG

The disaster at Fukushima has prompted Japan to thoroughly rethink its energy policy including its enforcement of nuclear safety standards. This month the government said it is setting up a new nuclear watchdog which will no longer be supervised by the trade ministry, which has traditionally promoted nuclear power. Instead the organization will be supervised by the environment ministry, seen as relatively untainted by the collusive ties with industry which plagued the existing agency.

"Crisis management, which had not been fully established before, will be embraced by the new organization. The group gathered today includes personnel from law enforcement and national defense to achieve this purpose," said Hosono on Friday at an inauguration ceremony for a group that will form the core of the new regulatory body.

The group consists of members from various government ministries as well as the private sector and will form the basis of the new body to be launched in April. *(Editing by Edwina Gibbs and Michael Watson)*

http://www.bbc.co.uk/news/health-14685612

Mosquitoes 'disappearing' in some parts of Africa

By Matt McGrath Science reporter, BBC World Service

Malaria-carrying mosquitoes are disappearing in some parts of Africa, but scientists are unsure as to why.

Figures indicate controls such as anti-mosquito bed nets are having a significant impact on the incidence of malaria in some sub-Saharan countries. But in Malaria Journal, researchers say mosquitoes are also disappearing from areas with few controls. They are uncertain if mosquitoes are being eradicated or whether they will return with renewed vigour.

Data from countries such as Tanzania, Eritrea, Rwanda, Kenya and Zambia all indicate that the incidence of malaria is dropping fast. Researchers believe this is due to effective implementation of control programmes, especially the deployment of bed nets treated with insecticide.

But a team of Danish and Tanzanian scientists say this is not the whole story. For more than 10 years they have been collecting and counting the number of mosquitoes caught in thousands of traps in Tanzania. In 2004 they caught over 5,000 insects. In 2009 that had dropped to just 14. More importantly, these collections took place in villages that weren't using bed nets.

'Chaotic rainfall'

One possibility for the reduction in numbers is climate change. Patterns of rainfall in these years were more chaotic in these regions of Tanzania and often fell outside the rainy season. The scientists say this may have disturbed the natural cycle of mosquito development.

But the lead author of the study, Professor Dan Meyrowitsch from the University of Copenhagen, says that he is not convinced that it is just the changing climate. "It could be partly due to this chaotic rainfall, but personally I don't think it can explain such a dramatic decline in mosquitoes, to the extent we can say that the malaria mosquitoes are almost eradicated in these communities. "What we should consider is that there may be a disease among the mosquitoes, a fungi or a virus, or they're may have been some environmental changes in the communities that have resulted in a drop in the number of mosquitoes"

The research team also found anecdotal evidence that their discovery was not an isolated case. Prof Meyrowitsch added: "Other scientists are saying they can't test their drugs because there are no children left with malaria. "They observed this in communities with no large interventions against malaria or mosquitoes. It may be the same scenario that the specific mosquitoes that carry malaria are declining very fast now"

The researchers are unsure if mosquitoes will return to these regions. If they do, one particular cause for concern is the young people who have not been exposed to malaria over the past five or six years since the mosquitoes began to decline.

"If the mosquito population starts coming up again" says Professor Meyrowitsch "and my own assumption is that it will, it is most likely we will have an epidemic of malaria with a higher level of disease and mortality especially amongst these children who have not been exposed."

http://www.eurekalert.org/pub_releases/2011-08/dumc-ast082511.php

Apixaban superior to warfarin for preventing stroke, reducing bleeding and saving lives

DURHAM, N.C. - *A large-scale trial finds that apixaban, a new anticoagulant drug, is superior to the standard drug warfarin for preventing stroke and systemic embolism in patients with atrial fibrillation.*

Moreover, apixaban results in substantially less bleeding and also results in lower mortality. The results were presented by Duke University Medical Center researchers at the European Society of Cardiology in Paris, France, today, and published simultaneously online in the New England Journal of Medicine.

"These are important findings because they show that, when compared to warfarin, a very effective treatment to prevent stroke, apixaban resulted in an additional 21 percent relative reduction in stroke or systemic embolism," says Christopher B. Granger, M.D., the study's lead author and professor of medicine at Duke. "It also resulted in a 31 percent relative reduction in major bleeding, as well as an 11 percent relative reduction in overall mortality."

The improvement in stroke prevention was statistically significant with P=0.011, the lower rate of major bleeding at P<0.001, and the lower mortality at P=0.047. Hemorrhagic stroke was reduced by about 50%. The randomized, double-blind clinical trial known as ARISTOTLE randomized 18,201 patients at 1034 clinical sites in 39 countries, giving them either 5 mg twice daily of apixaban or warfarin for an average of 1.8 years.

Apixaban has several major practical advantages over warfarin in addition to the therapeutic benefits, says John Alexander, M.D., a study co-author and Duke cardiologist. "It does not require monitoring and has few interactions with other medications or food. Apixaban was better tolerated than warfarin, with fewer discontinuations."

The benefits of reducing stroke and lower rates of bleeding were consistent across all major subgroups, and despite the heterogeneity that exists in the quality of warfarin use across the world, says Alexander.

The number of events prevented per 1,000 people, which indicate absolute risk reduction, was also impressive, says Alexander. Apixaban prevented 6 patients from having a stroke, 15 patients from having major bleeding, and 8 patients from dying. The major effect on stroke prevention was on hemorrhagic stroke. Apixaban prevented 4 patients from having hemorrhagic stroke and 2 patients from having an ischemic or uncertain type of stroke.

Atrial fibrillation is a common abnormal heart rhythm that affects more than 2.6 million Americans. It occurs when the heart's electrical activity becomes disorganized, resulting in an irregular heartbeat with ineffective contraction of the upper chambers of the heart. The potential for blood clots to form, and one's risk for stroke, increases as a result.

Warfarin is a vitamin K antagonist that is well documented for its ability to prevent blood clots. Previous studies indicate that long-term use of warfarin in patients with atrial fibrillation and other stroke risk factors can reduce stroke by up to 70 percent. But only about half of patients who could benefit from warfarin actually do. Patients on warfarin must have regular blood tests to monitor and adjust the dose and avoid certain foods and medications that interfere with warfarin's effect. Warfarin also increases bleeding rusj including intracranial hemorrhage.

"There is an enormous unmet need for treatment of patients at risk for stroke associated with atrial fibrillation," says Granger. "Only about half of patients who should be treated are being treated. The disparity exists because warfarin treatment has several limitations."

Doctors and patients have been eagerly awaiting alternative therapies to warfarin, one of which is currently available. Several others are currently under investigation in large clinical trials.

Apixaban is an oral direct factor Xa inhibitor that showed promise last year when trial findings presented at the European Society of Cardiology showed apixaban patients were 54 percent less likely to have a stroke or blood clot than those who took aspirin. Apixaban and aspirin showed similar risks of major bleeding.

"Our study indicates treatment with apixaban is more effective than warfarin in preventing stroke without the need for anticoagulation monitoring," says Lars Wallentin, M.D., the study committee's co-chair, professor of cardiology, and director of the Uppsala Clinical Research Center University Hospital in Sweden.

The study also shows apixaban is safer than warfarin, according to Wallentin. "Our findings show a single dose of apixaban accomplishes the same stroke prevention goal as adjusted-dose warfarin with a substantially lower risk of all types of bleeding across different ages, and with lower rates of discontinuation."

The study was coordinated by Uppsala Clinical Research Institute, Sweden and the Duke Clinical Research Institute. It was funded by Bristol-Myers Squibb, Co and Pfizer Inc.

Additional study authors include: John J. V. McMurray, M.D., Cardiovascular Research Centre, University of Glasgow; Renato Lopes, DCRI; Elaine Hylek, Boston University; Michael Hanna, BMS; Hussein Al-Khalidi, DCRI; Jack Ansell, Lenox

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http://www.eurekalert.org/pub_releases/2011-08/acs-rfe080311.php

Research from Everest: Can leucine help burn fat and spare muscle tissue during exercise?

DENVER - Resear*ch on Mt. Everest climbers is adding to the evidence that an amino acid called leucine - found in foods, dietary supplements, energy bars and other products - may help people burn fat during periods of food restriction, such as climbing at high altitude, while keeping their muscle tissue.*

It was one of two studies reported here today at the 242nd National Meeting & Exposition of the American Chemical Society (ACS) on the elite corps of men and women who have tackled the highest peak on Earth, mountaineering's greatest challenge.

In a pilot study of the feasibility of supplementing the diet of climbers with the branch chain amino acid, leucine, scientists studied 10 climbers for 6-8 weeks as they ascended Mt. Everest, which towers 29,000 feet above sea level. Since Sir Edmund Hillary and Sherpa guide Tenzing Norgay made the first successful climb in 1953, over 2,500 people have scaled Mt. Everest in the Himalayas. Thousands more tried and failed, with more than 216 deaths. The researchers were studying the physiological benefits of adding leucine to the climbers' diets to help them stay healthy. The researchers are from the University of Utah.

Wayne Askew, Ph.D., and his co-investigator, Stacie Wing-Gaia, Ph.D., who headed the leucine study, explained that the extreme weather conditions, low oxygen levels, treacherous terrain and strenuous exercise during such climbs create a huge nutritional challenge. Weight loss at high altitude is exactly the opposite problem that is on the minds of millions of people in the United States and other countries who are trying to shed excess weight. Climbers often cannot or do not eat enough calories, failing to replenish their bodies with important nutrients. They lose both fat and muscle during an arduous climb, endangering their strength and motor coordination. At high altitudes, fat and muscle loss occurs not only when they are climbing, but also at rest.

"The significant part about this weight loss is that a disproportionate amount comes from the muscle mass," said Askew. "This can be a problem on long expeditions at high altitude because the longer climbers are there and the higher they go, the weaker they get. The body breaks down the muscle for energy, so climbers don't have it available for moving up the mountain.

"We knew that leucine has been shown to help people on very low-calorie, or so-called 'calorie-restricted diets', stay healthy at sea level," said Askew. "It's one of the components, the building blocks, of protein. But no one had tested whether leucine would help people stay healthy and strong at high altitudes, so we added leucine to specially prepared food bars that we gave to the climbers."

Askew didn't climb Mt. Everest, but members of his research team, Dr. Wing-Gaia and Dr. Rodway, went to base camp and measured expedition members' fat and muscle by using an ultrasound device placed on the skin. They are currently examining the data to see whether climbers who ate the leucine bar retained more muscle than those who ate a bar without leucine. One finding that was apparent early on in the study was that the food item in which the leucine was delivered was critically important. The Everest climbers had difficulties consuming the three food bars per day that contained the additional leucine. Askew stressed that this was a small pilot study to test the feasibility of leucine supplementation at altitude, so definitive conclusions of its benefits at altitude await the results of a more controlled clinical study. The researchers plan to improve the palatability of the leucine food vehicle in consultation with military food product developers at Natick Research Development and Engineering Center and conduct a more controlled study at high altitude, possibly with the U.S. Army Institute of Environmental Medicine at their laboratory on Pike's Peak.

Askew pointed out that the findings also could help people at lower altitudes who want to lose weight while preserving their lean body mass, or who are elderly and don't eat or exercise enough to maintain their strength. He predicts that consumers might one day see leucine-rich bars on grocery store shelves, especially at high-altitude locations, such as Aspen and Denver, where high-altitude skiing and climbing activities are popular.

In the other Everest report, John Finley, Ph.D., described a study in which he gave Mt. Everest climbers a type of fat called "medium-chain triglycerides" in their cookies and hot chocolate. They also took an aspirin every day. "We tried to improve climbers' performances by feeding them medium-chain triglycerides - fat that we thought would be metabolized better as quick energy," said Finley, who is with Louisiana State University.

At high altitudes, the air pressure is low and the oxygen is less dense - making less oxygen available for breathing. In response, the body makes more oxygen-carrying red blood cells. This thickens the blood and puts a strain on the heart and lungs, increasing the risk of potentially dangerous blood clots. That's why Finley also had the climbers take aspirin, which is known for thinning the blood and reducing the risks of having a heart attack or stroke. "We found that we could reduce the risk factors involved in having more viscous blood at high altitudes by giving the climbers aspirin," he said.

Finley himself went on the climb and collected urine and fecal samples. The climbers who consumed the medium-chain triglycerides lost less weight and performed better than others on the expedition. The data also suggested that fats aren't absorbed well at high altitudes when the body is losing a lot of weight, possibly because too little bile is produced by the liver to dissolve the fats, he explained. Finley doesn't have plans to commercialize the medium-chain triglyceride hot chocolate and cookies, but suggests that people going to high-altitude locations talk with their health-care providers about taking a daily aspirin.

http://medicalxpress.com/news/2011-08-scientists-sutureless-method-blood-vessels.html

Scientists develop sutureless method for joining blood vessels

Researchers at the Stanford University School of Medicine developed a sutureless method that appears to be a faster, safer and easier alternative

Reconnecting severed blood vessels is mostly done the same way today - with sutures - as it was 100 years ago, when the French surgeon Alexis Carrel won a Nobel Prize for advancing the technique. Now, a team of researchers at the Stanford University School of Medicine has developed a sutureless method that appears to be a faster, safer and easier alternative.

In animal studies, a team led by Stanford microsurgeon Geoffrey Gurtner, MD, used a poloxamer gel and bioadhesive rather than a needle and thread to join together blood vessels, a procedure called vascular anastomosis. Results of the research will be published online Aug. 28 in Nature Medicine. Lead authors of the study were Stanford postdoctoral scholar Edward Chang, MD, and surgery resident Michael Galvez, MD.

The big drawback of sutures is that they are difficult to use on blood vessels less than 1 millimeter wide. Gurtner began thinking about alternatives to sutures about a decade ago. "Back in 2002, I was chief of microsurgery at Bellevue in New York City, and we had an infant - 10 to 12 months old - who had a finger amputated by the spinning wheel of an indoor exercise bike," said Gurtner, senior author of the study and professor of surgery. "We struggled with reattaching the digit because the blood vessels were so small - maybe half a millimeter. The surgery took more than five hours, and at the end we were only able to get in three sutures. "Everything turned out OK in that case," he continued. "But what struck me was how the whole paradigm of sewing with a needle and thread kind of falls apart at that level of smallness."

Sutures are troublesome in other ways, too. They can lead to complications, such as intimal hyperplasia, in which cells respond to the trauma of the needle and thread by proliferating on the inside wall of the blood vessel, causing it to narrow at that point. This increases the risk of a blood clot getting stuck and obstructing blood flow. In addition, sutures may trigger an immune response, leading to inflamed tissue that also increases the risk of a blockage. The new method could sidestep these problems. "Ultimately, this has the potential to improve patient care by decreasing amputations, strokes and heart attacks while reducing health-care costs," the authors write in the study.

Earlier in his career, as Gurtner contemplated a better way of joining together blood vessels, he considered whether ice could be used to fill the lumen, the inner space of the blood vessel, to keep both ends open to their full diameter long enough to glue them together. Not feasible, he concluded. "Water turns to ice quite slowly and you would have to drop the temperature of the surgical site a lot - from 98.6 degrees to 32 degrees Fahrenheit," he said.

Shortly after arriving at Stanford in 2005, Gurtner approached fellow faculty member Gerald Fuller, PhD, professor of chemical engineering and the Fletcher Jones II Professor in the School of Engineering, about whether he knew of a substance that could be turned easily from a liquid to a solid and back to a liquid again, and that would also be safe to use in vascular surgery. Fuller immediately suggested a Food and Drug Administration-approved thermoreversible poloxamer called Poloxamer 407. It is constructed of polymer blocks whose properties can be reversed by heating.

Fuller teamed up with Jayakumar Rajadas, PhD, director of the Stanford Biomaterials and Advanced Drug Delivery Laboratory, to modify the poloxamer so that it would become solid and elastic when heated above

body temperature but dissolve harmlessly into the bloodstream when cooled. The poloxamer then was used to distend both openings of a severed blood vessel, allowing researchers to glue them together precisely.

The researchers used a simple halogen lamp to heat the gel. In tests on animals, the technique was found to be five times faster than the traditional hand-sewn method, according to the study. It also resulted in considerably less inflammation and scarring after two years. The method even worked on extremely slim blood vessels - those only 0.2 mm wide - which would have been too tiny and delicate for sutures. "That's where it really shines," Gurtner said.

Dermabond, a surgical sealant, was used to attach the ends of the blood vessels together. Poloxamers have been used before as a vehicle for delivering drugs, including chemotherapeutics, vaccines and anti-viral therapies. Researchers have used Poloxamer 407 to occlude blood vessels in experimental animals for the purpose of evaluating the gel's safety and efficacy in so-called "beating heart surgery," in which certain vessels need to be temporarily blocked to improve visibility for the surgeons performing a coronary artery bypass.

Although other sutureless methods have been developed, they generally have not produced better outcomes, the authors said. "Often, the use of microclips, staples or magnets is itself traumatic to blood vessels leading to failure rates comparable to or higher than sutured anastomoses," they wrote.

"This is a novel approach to anastomosis that could play a valuable role in microvascular surgery," said Frank Sellke, MD, chief of cardiothoracic surgery at Brown University Medical Center and associate editor of the Journal of Thoracic and Cardiovascular Surgery, who was not involved in the study. "But it really needs to show that it holds up in clinical trials."

The authors say further testing on large animals is needed before human trials can begin, but they note that all of the components used in the technique are already approved by the FDA. "This technology has the potential to progress rapidly from the 'bench to bedside,'" they write.

Gurtner said he believes the new technique could satisfy a huge unmet need and prove especially useful in minimally invasive surgeries, in which manipulating sutures takes on a whole new level of difficulty.

Michael Longaker, MD, the Deane P. and Louise Mitchell Professor in the School of Medicine and a co-author of the study, called the technique a "potential game-changer." "When you're bringing together hollow tubes, whether they're large structures, like the colon or the aorta, or a small structure, like a vein in the finger of a child, you're always worried about lining them up directly and effectively sealing them," Longaker said. "The technique that Dr. Gurtner has pioneered could allow surgeons to perform anastomosis more quickly and with improved precision."

He continued: "Coming up with this solution was the result of the classic Stanford model of bringing together researchers from a variety of disciplines." *Provided by Stanford University Medical Center*