http://www.eurekalert.org/pub_releases/2011-10/jaaj-shp101411.php

## Some hair professionals report looking for skin cancer lesions on customers' scalp, neck and face

***In a survey of hair professionals, some reported that they look at customers' face, scalp and neck for suspicious skin lesions***

CHICAGO - In a survey of hair professionals, some reported that they look at customers' face, scalp and neck for suspicious skin lesions, according to a report in the October issue of Archives of Dermatology, one of the JAMA/Archives journals."Melanoma of the scalp and neck represented 6 percent of all melanomas and accounted for 10 percent of all melanoma deaths in the United States from 1973 to 2003, with a five-year survival probability of 83.1 percent for stage I melanoma of the scalp and neck compared with 92.1 percent for stage I melanoma of other sites," the authors write as background information in the article.

Elizabeth E. Bailey, M.D., of Brigham and Women's Hospital and Harvard School of Public Health, Boston, and colleagues conducted a survey of 304 hair professionals from 17 salons in a single chain in the greater Houston area. Of 304 professionals surveyed in January 2010, 203 completed the questionnaire (66.8 percent response rate), which included questions on the frequency with which they observed their customers' scalp, neck and face for abnormal moles during the previous month.

Of the 203 respondents, 69 percent reported being "somewhat" or "very likely" to give customers a skin cancer information pamphlet during an appointment; 49 percent reported they were "very" or "extremely" interested in participating in a skin cancer education program; and 25 percent share general health information with customers "often" or "always." Most respondents (71.9 percent) also reported they had not received a course on skin cancer but a modest number were educating their customers and observing for suspicious lesions.

When answering questions about observing suspicious skin lesions during the previous month, 73 participants (37.1 percent) reported looking at more than 50 percent of their customers' scalps; 56 (28.8 percent) reported looking at more than 50 percent of their customers' necks; and 30 (15.3 percent) reported looking at more than 50 percent of their customers' faces. Additionally, 58 percent of participants reported they had recommended at least once that a customer see a health professional for an abnormal mole.

The authors also found that frequency of observation of their customers' lesions was associated with their own self-reported health communication practices and personal skin practices but was not associated with their own knowledge about skin cancer.

"In conclusion, this study provides evidence that hair professionals are currently acting as lay health advisors for skin cancer detection and prevention and are willing to become more involved in skin cancer education in the salon," the authors write. "Future research should focus on creating a program that provides hair professionals with expert training and effective health communication tools to become confident and skilled lay skin cancer educators."

*(Arch Dermatol. 2011;147[10]:1159-1165. Available pre-embargo to the media at http://www.jamamedia.org.)*

*Editor's Note: This study was supported by the Melanoma Foundation of New England. Please see the article for additional information, including other authors, author contributions and affiliations, financial disclosures, funding and support, etc.*

http://www.eurekalert.org/pub_releases/2011-10/uoc-slw101711.php

## Sea levels will continue to rise for 500 years

***Rising sea levels in the coming centuries is perhaps one of the most catastrophic consequences of rising temperatures.***

Massive economic costs, social consequences and forced migrations could result from global warming. But how frightening of times are we facing? Researchers from the Niels Bohr Institute are part of a team that has calculated the long-term outlook for rising sea levels in relation to the emission of greenhouse gases and pollution of the atmosphere using climate models. The results have been published in the scientific journal Global and Planetary Change.

"Based on the current situation we have projected changes in sea level 500 years into the future. We are not looking at what is happening with the climate, but are focusing exclusively on sea levels", explains Aslak Grinsted, a researcher at the Centre for Ice and Climate, the Niels Bohr Institute at the University of Copenhagen.

**Model based on actual measurements**

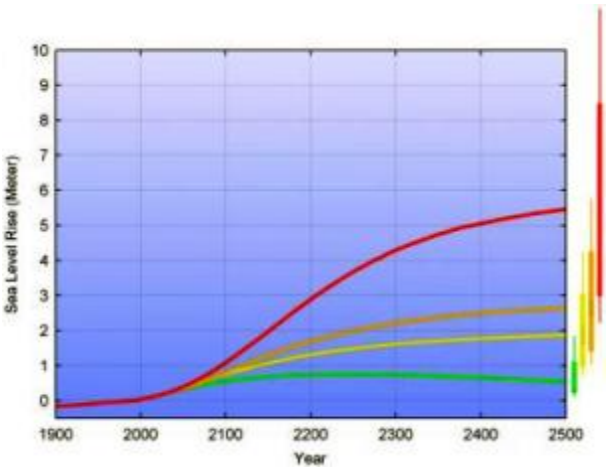
He has developed a model in collaboration with researchers from England and China that is based on what happens with the emission of greenhouse gases and aerosols and the pollution of the atmosphere. Their model has been adjusted backwards to the actual measurements and was then used to predict the outlook for rising sea levels.

The research group has made calculations for four scenarios:

A pessimistic one, where the emissions continue to increase. This will mean that sea levels will rise 1.1 meters by the year 2100 and will have risen 5.5 meters by the year 2500.

Even in the most optimistic scenario, which requires extremely dramatic climate change goals, major technological advances and strong international cooperation to stop emitting greenhouse gases and polluting the atmosphere, the sea would continue to rise. By the year 2100 it will have risen by 60 cm and by the year 2500 the rise in sea level will be 1.8 meters.

For the two more realistic scenarios, calculated based on the emissions and pollution stabilizing, the results show that there will be a sea level rise of about 75 cm and that by the year 2500 the sea will have risen by 2 meters.




***The graph shows how sea levels will change for four different pathways for human development and greenhouse gas pollution. The green, yellow and orange lines correspond to scenarios where it takes 10, 30, or 70 years before emissions are stabilized. The red line can be considered to represent business as usual where greenhouse gas emissions are increasing over time.*** **Aslak Grinsted**

**Rising sea levels for centuries**

"In the 20th century sea has risen by an average of 2mm per year, but it is accelerating and over the last decades the rise in sea level has gone approximately 70% faster. Even if we stabilize the concentrations in the atmosphere and stop emitting greenhouse gases into the atmosphere, we can see that the rise in sea level will continue to accelerate for several centuries because of the sea and ice caps long reaction time. So it would be 2-400 years before we returned to the 20th century level of a 2 mm rise per year", says Aslak Grinsted.

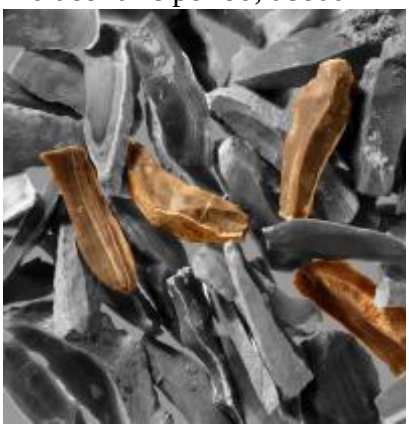
He points out that even though long-term calculations are subject to uncertainties, the sea will continue to rise in the coming centuries and it will most likely rise by 75 cm by the year 2100 and by the year 2500 the sea will have risen by 2 meters. *http://dx.doi.org/10.1016/j.gloplacha.2011.09.006*

***http://www.eurekalert.org/pub_releases/2011-10/afot-afb101711.php***

## Archaeologists find blade production earlier than originally thought

### *Blade manufacturing 'production lines' existed as much as 400,000 years ago, say Tel Aviv University researchers*

Archaeology has long associated advanced blade production with the Upper Palaeolithic period, about 30,000-40,000 years ago, linked with the emergence of Homo Sapiens and cultural features such as cave art. Now researchers at Tel Aviv University have uncovered evidence which shows that "modern" blade production was also an element of Amudian industry during the late Lower Paleolithic period, 200,000-400,000 years ago as part of the Acheulo-Yabrudian cultural complex, a geographically limited group of hominins who lived in modern-day Israel, Lebanon, Syria and Jordan.



Prof. Avi Gopher, Dr. Ran Barkai and Dr. Ron Shimelmitz of TAU's Department of Archaeology and Ancient Near Eastern Civilizations say that large numbers of long, slender cutting tools were discovered at Qesem Cave, located outside of Tel Aviv, Israel. This discovery challenges the notion that blade production is exclusively linked with recent modern humans.

***Blades (tinted brown) found at Qesem Cave in Israel, the product of a sophisticated "production line."*** **Dr. Ran Barkai/American Friends of Tel Aviv University (AFTAU)**

The blades, which were described recently in the Journal of Human Evolution, are the product of a well planned "production line," says Dr. Barkai. Every element of the blades, from the choice of raw material to the production method itself, points to a sophisticated tool production system to rival the blade technology used hundreds of thousands of years later.

**An innovative product**

Though blades have been found in earlier archaeological sites in Africa, Dr. Barkai and Prof. Gopher say that the blades found in Qesem Cave distinguish themselves through the sophistication of the technology used for manufacturing and mass production.

Evidence suggests that the process began with the careful selection of raw materials. The hominins collected raw material from the surface or quarried it from underground, seeking specific pieces of flint that would best fit their blade making technology, explains Dr. Barkai. With the right blocks of material, they were able to use a systematic and efficient method to produce the desired blades, which involved powerful and controlled blows that took into account the mechanics of stone fracture. Most of the blades of were made to have one sharp cutting edge and one naturally dull edge so it could be easily gripped in a human hand.

This is perhaps the first time that such technology was standardized, notes Prof. Gopher, who points out that the blades were produced with relatively small amounts of waste materials. This systematic industry enabled the inhabitants of the cave to produce tools, normally considered costly in raw material and time, with relative ease. Thousands of these blades have been discovered at the site. "Because they could be produced so efficiently, they were almost used as expendable items," he says.

Prof. Cristina Lemorini from Sapienza University of Rome conducted a closer analysis of markings on the blades under a microscope and conducted a series of experiments determining that the tools were primarily used for butchering.

**Modern tools a part of modern behaviors**

According to the researchers, this innovative industry and technology is one of a score of new behaviors exhibited by the inhabitants of Qesem Cave. "There is clear evidence of daily and habitual use of fire, which is news to archaeologists," says Dr. Barkai. Previously, it was unknown if the Amudian culture made use of fire, and to what extent. There is also evidence of a division of space within the cave, he notes. The cave inhabitants used each space in a regular manner, conducting specific tasks in predetermined places. Hunted prey, for instance, was taken to an appointed area to be butchered, barbequed and later shared within the group, while the animal hide was processed elsewhere.

***http://medicalxpress.com/news/2011-10-eye.html***

## Whether we know it or not, we can 'see' through one eye at a time

***Although portions of the visible world come in through one eye only, the brain instantaneously takes all that information and creates a coherent image.***

As far as we know, we 'see' with both eyes at once. Now a new study suggests that the brain may know which eye is receiving information - and can turn around and tell that eye to work even harder.

“We have demonstrated for the first time that you can pay attention through one eye, even when you have no idea where the image is coming from,” says Peng Zhang, who conducted the study with University of Minnesota colleagues Yi Jiang and Sheng He. And the harder that eye is working - the heavier the “informational load” - the more effectively still that eye can attend to its object. The findings will appear in an upcoming issue of Psychological Science, a journal published by the Association for Psychological Science.

The researchers conducted two experiments, each with six observers ages 20 to 29, who viewed images through a mechanism that can separate stimuli by eye. In the first experiment, in one eye a target - which looked like a shiny compact disc - gradually emerged in a sweeping fashion. In the other eye a “noise patch” of high-contrast flashing colored squares was displayed. Each image was in the same spot relative to its respective eye, so the two appeared in the same place in the field of vision; the target seemed to displace the patch as it came into view. A small round “cue,” either in the target eye or the noise eye, also gradually turned from red to gray or back and got fat or thin. Participants had to press a button when it turned, say, red or fat and gray. At the same time, they had to press as soon as they saw any part of the target appear.

The viewers took less time to notice the emerging target when it was in the same eye as the cue.

In the second experiment, the task was harder. Two cues were displayed at once and participants had to attend to both or to two “features” at once - indicating for instance when both were red or both red and thick. Like tougher training improving an athlete’s performance, the additional “load” forced that eye to work harder - and, the researchers found, enhanced that eye’s abilities further. Again, the target appeared even faster when the cues were in the target eye and even slower when they were in the noise eye.

The findings, says Zhang, suggest some intriguing things about the visual system. “Maybe there are binocular neurons in the brain” - neurons that take in and collate information from both eyes - “that also know which eye that information is coming from and can feed back to that eye,” telling it to pay closer attention. In other words, the mechanisms of visual perception, and the communications between eye and brain, may be even more flexible and powerful than scientists thought. *Provided by Association for Psychological Science*

http://blogs.nature.com/news/2011/10/peashooter_theory_aims_to_expa.html

# Pea shooter theory aims to build solar system - October 06, 2011

***Researchers are now suggesting that all the planets in the solar system began forming at roughly Earth's distance from the Sun***

Planetary scientists don't usually don catcher's masks at the end of a professional talk, but Hal Levison of the Southwest Research Institute in Boulder, Colorado, wasn't taking any chances. Acknowledging just how outrageous his new theory of planet formation is, Levison, who looks like an ex-hippie, joked that he wanted to be prepared in case his audience started throwing things. Levison presented the work on 6 October at a joint meeting of the European Planetary Science Conference and the American Astronomical Society's Division for Planetary Sciences in Nantes, France.

Levison is a formidable force in this field, well known for his contribution to the so-called 'Nice model' of outer solar system formation (see Nature 435, 459-461; 26 May 2005) Thus, the audience of planetary scientists was playful but remarkably respectful, given that Levison, David Minton of Purdue University in Indiana and their colleagues are now suggesting that all the planets in the solar system began forming at roughly Earth's distance from the Sun. As the researchers see it, each embryonic planet from Neptune to Mars would shoot outward in succession through the disk of gas and dust that surrounded the young Sun. During the journey, each would grab enough mass from the disk to reach its present planetary size in an incredibly fast one million years.

Neptune would be the oldest planet, since it shot through the disk first. That's in stark contrast to the traditional planet-forming model, in which fledgling planets stay put and continue forming at about the same orbital radii where they first coalesced, accumulating material only from their immediate surroundings. In that conventional scenario, Neptune would rank among the youngest planets since it would have taken much longer for material in the outer reaches of the disk to collide and stick together.

**The** standard model has had several successes, so why are Levison and his colleagues messing with a perfectly good theory? Because it isn't, they say. The theory can't explain how the giant planets, especially Uranus and Neptune, can finish forming before all the gas in the disk dissipates - a roughly five million year window.

It's widely accepted that all the planets started with rocky cores. In the case of the gaseous, outer planets, the rocky cores had to snare vast shrouds of gas. But in the outer part of the disk, where the standard theory says the outer planets formed, material orbits more slowly and it takes too long to form a core. By then the gas needed to build up the gas giants should already have departed. That apparent contradiction has left planetary scientists with an unsatisfying account of what happened.

In the new model - which Levison stresses is so far only a 'fairy tale' whose details have yet be worked out - he and his collaborators considered the complex dance that emerges between vast numbers of 50-kilometer-size solid bodies, or planetesimals, that form at around Earth's distance from the Sun and a few bigger, moon-size bodies that also happen to coalesce every so often. They discovered that when certain conditions are met, interactions with the planetesimals will drive a lunar-size body outwards. It will then zip through the outer disk of virgin, undisturbed material, gathering up enough solids to grow a massive core and then collecting a hefty portion of available gas.

As long as there is enough time for the disk to settle back down before a new lunar-size body happened to emerge in the inner part of the disk, it, too will shoot out, rapidly accumulating a sizable solid core.

In this fairytale, Neptune ought to have the fattest core because it moved through the disk first and had the best chance at capturing solid material. There is tentative evidence that supports this, argues Minton, because Neptune puts out more heat than expected. If it formed first, with a larger core, it should have a greater abundance of aluminum-26, a radioactive element common in the very early solar system and a heat source.

Jupiter ought to have the smallest core because it's the last gas giant to form, but because it spent more time in the disk, it grabs more gas and has a larger shroud.

Then there's little Mars - as Levison and Minton see it, it's the last planet to be pushed through the disk, which, by then, is severely depleted of material. There aren't enough planetesimals to push the body very far and not enough material to make it very big. So it gets nudged just slightly beyond where it first grew and remains relatively small - solving the puzzle of why Mars is so much smaller than Earth and Venus.

And what about our own planet and its hot sister? The disk is essentially kaput by the time they come along, the researchers say, and these rocky planets grew by clumping together whatever remaining planetesimals were left in the inner region of the disk. (Mercury is yet another story, adds Minton.)

A determination of Neptune's age would provide one clear test of the model, notes Minton. As to how one would go about determining the planet's age, Minton jokes, with a wave of his hand, "I'll leave that as an exercise to the readers."

William McKinnon of Washington University in St. Louis seemed to sum up the reaction in the small, crowded lecture room: “It’s an interesting idea. We’ll have to see if it pans out.”
Levison acknowledges the theory is "radical". If correct, he says, “it will turn planetary science on its head.” If it’s wrong, he adds, “maybe, they’ll have me turn in my planetary science badge and my decoder ring. So be it.”

***http://www.nytimes.com/2011/10/18/health/research/18birth.html?_r=1&partner=rss&emc=rss***

## Turncoat of Placenta Is Watched for Trouble

***In mother-and-child paintings and Henry Moore sculptures, mothers and babies meld together with such ease they appear as one. But in the course of some pregnancies, the embryo’s struggle for nutrients can escalate into all-out war with the mother, a dangerous condition called pre-eclampsia.***

**By RONI CARYN RABIN**

During a healthy pregnancy, the mother’s immune response against an invading foreign tissue - including an embryo and placenta - is dampened. Pre-eclampsia, a form of high blood pressure in pregnancy that strains the mother’s kidneys, results when that process is thwarted, the researchers suggest.

The early-onset form of the condition, which starts at the beginning of gestation and continues until birth, affects one in 20 pregnancies and can cause seizures, stroke and death; the only cure is to deliver the baby. Now, scientists have proposed a novel hypothesis to explain how it develops.

The new hypothesis is based in part on new findings about a sneaky protein made by the placenta, dubbed PP13 (for placental protein 13), which were published online last week in the journal Reproductive Sciences.

PP13 is known to be unusually low in women who develop pre-eclampsia, but its precise role in pregnancy has been a mystery. Dr. Harvey J. Kliman, a reproductive sciences researcher at Yale School of Medicine and the lead author of the paper, believes that the protein, acting as an agent of the placenta that nourishes the embryo, plays a key role in deflecting the mother’s response.

“The placenta will do everything it can to survive,” Dr. Kliman said. “It’s controlled by the genes of the father, and the father’s goal is to make the biggest placenta and the biggest baby possible.”

This puts it at odds with the mother’s evolutionary interests, he said. “The mother’s goal is not to die during childbirth.”

During gestation, placental tissue cells called trophoblasts act like invaders, attacking the maternal blood vessels that supply blood to the embryo in an effort to draw even more nutrients to the placenta to increase the supply of nutrients.

The mother’s body, he said, “should kill these cells and would like to.” But if the process of opening up the arteries fails, the fetus doesn’t draw sufficient blood from the mother, and she may develop pre-eclampsia. This rise in blood pressure increases blood flow to the placenta, but it is dangerous for the mother.

The question the researchers set out to answer was: what is PP13’s role in all this?

After obtaining placental specimens from normal pregnancies that were terminated abroad before the 14th week of gestation, researchers tested them for the presence of the protein and were surprised by two findings: large areas of dead maternal tissue around the veins in the maternal tissue, or decidua, under the placenta, along with a rich concentration of the protein PP13.

Finding necrotic tissue within maternal tissue in a normal pregnancy was completely unexpected, Dr. Kliman said. “If you told me that we’d find areas of death and destruction in a normal pregnancy, I’d say you were nuts,” he said. “It looked like a battlefield.”

Now he and his colleagues believe that PP13 acts as a decoy, distracting the mother’s immune cells away from the placental attack on the arteries by creating a diversion elsewhere - the mother’s veins. “Let’s say we’re planning to rob a bank, but before we rob the bank we blow up a grocery store a few blocks away so the police are distracted,” he explained. “That’s what we think this is. It’s the placenta saying, ‘Oh, I need to distract Mom and sneak in while she’s dealing with her inflamed veins.’ ”

“It’s very sneaky,” he added.

The hypothesis won’t immediately help with treatment of pre-eclampsia. But a new test to measure PP13 in pregnancy may help identify women at risk for pre-eclampsia early in gestation so they can be monitored more closely.

David Haig, a professor of evolutionary biology at Harvard University, who was not involved in the research, said the paper posed an interesting hypothesis, though more work needs to be done to prove it. “Natural selection comes up with amazing adaptations,” he said.

http://www.nytimes.com/2011/10/18/health/18global.html?_r=1&partner=rss&emc=rss

## Australia: Man's Serious Illness Shows the Danger of Daring to Eat a Garden-Variety Slug

***An Australian man has been hospitalized for more than a month in serious condition as a result of eating two garden slugs on a dare, according to Australian news media and ProMED , an online service that tracks disease outbreaks.***

**By DONALD G. McNEIL Jr.**

The 21-year-old Sydney man apparently contracted a rat lungworm parasite from the slugs, which pick it up from rodent droppings. The parasite, a nematode called Angiostrongylus cantonensis, can cause fatal brain swelling.

The ProMED moderator who reported the case said the life cycle of the nematode was described in Australia 50 years ago. It infects not just slugs, rats and humans but also dogs, horses, flying fox bats and marsupials like kangaroos. It can also be caught from unwashed vegetables.

"We hope this will help to remind others to avoid eating raw slugs," the moderator, Eskild Petersen, said.

The disease is more common in Thailand, where koi-hoi, a dish with raw snail meat, is eaten; residents of Hawaii have been infected by eating improperly washed lettuce with tiny slugs on it.

Escargots - snails baked in a garlic butter sauce - are generally safe, although they can trigger shellfish allergies. Snails "ranched" for restaurants (like those pictured above) are raised on clean feed and purged. Garden snails may contain poisons, including snail bait. There has been at least one report of people who developed erratic heart rhythms after eating stew made from snails that had eaten oleander leaves, which contain digoxin, a cardiac drug.

http://medicalxpress.com/news/2011-10-shift-teens-linked-multiple-sclerosis.html

## Shift work in teens linked to increased multiple sclerosis risk

***Researchers from Sweden have uncovered an association between shift work and increased risk of multiple sclerosis (MS).***

Those who engage in off-hour employment before the age of 20 may be at risk for MS due to a disruption in their circadian rhythm and sleep pattern. Findings of this novel study appear today in Annals of Neurology, a journal published by Wiley-Blackwell on behalf of the American Neurological Association and Child Neurology Society.

Previous research has determined that shift work - working during the night or rotating working hours - increases the risk of cardiovascular disease, thyroid disorders, and cancer. Circadian disruption and sleep restriction are associated with working night shifts; these factors are believed to disturb melatonin secretion and increase inflammatory responses, promoting disease states. MS is a central nervous system autoimmune inflammatory disorder that has an important environmental component, thus investigating lifestyle risk factors, such as sleep loss related to shift work, is an important objective and the focus of the current study.

Dr. Anna Karin Hedström and colleagues from the Karolinska Institutet in Stockholm analyzed data from two population-based studies - one with 1343 incident cases of MS and 2900 controls and another with 5129 prevalent MS cases and 4509 controls. The team compared the occurrence of MS among study subjects exposed to shift work at various ages against those who had never been exposed. All study subjects resided in Sweden and were between the ages of 16 and 70. Shift work was defined as permanent or alternating working hours between 9 p.m. and 7 a.m.

"Our analysis revealed a significant association between working shift at a young age and occurrence of MS," explains Dr. Hedström. "Given the association was observed in two independent studies strongly supports a true relationship between shift work and disease risk." Results showed that those in the incident MS cohort who had worked off-hour shifts for three years or longer before age 20 had a 2 fold-risk of developing MS compared with those who never worked shifts. Similarly, subjects in the prevalent cohort who engaged in shift work as teens had slightly more than a 2-fold risk of MS than subjects who never worked shifts.

The authors suggest that disruption of circadian rhythm and sleep loss may play a role in the development of MS; however the exact mechanisms behind this increased risk remain unclear and further study is needed.

*More information: "Shift Work at Young Age is Associated with Increased Risk for Multiple Sclerosis." Anna Karin Hedström, Torbjörn Åkerstedt, Jan Hillert, Tomas Olsson and Lars Alfredsson. Annals of Neurology; Published Online: October 18, 2011 (DOI:10.1002/ana.22597). Provided by Wiley*

http://arstechnica.com/science/news/2011/10/when-did-the-giant-impact-that-formed-the-moon-take-place.ars

# When did the giant impact that formed the Moon take place?

***Most dating methods place this collision at 30 million years after the formation of the solar system, but a few recent measurements have suggested it might have occurred as late as a hundred million years after its formation***

**By John Timmer**

The prevailing model of solar system formation suggests that, in the inner solar system, small bodies formed rapidly and then began to form larger ones through a series of collisions. For the original Earth, this ended with a big one: a run-in with a Mars-sized body that completely melted the planet and left enough debris in orbit to form the Moon. Most dating methods place this collision at 30 million years after the formation of the solar system, but a few recent measurements have suggested it might have occurred as late as a hundred million years after its formation. A new model that takes into account the distribution of various metals in the crust now suggests that the Moon-forming giant impact (MGI) could have occurred much later - but only if the Earth formed more quickly than expected.

The primary method of dating the age of early events like this is the ratio of tungsten (W) isotopes in the crust. The amount of $^{184}W$ has been stable since the start of the solar system. $^{182}W$, however, forms from the decay of a radioactive form of hafnium that has a half-life of 9 million years. As long as the Earth's interior isn't mixed, decay of hafnium will produce an excess of the lighter tungsten isotope, at least within the first 50 million years or so, after which point there wouldn't be much left to decay.

Each of the major impacts, however, would remix the crust and allow metals to sink to the core, essentially resetting the clock. Each time the clock was reset, there was less hafnium to decay, and so less $^{182}W$ would be produced. Dating using this technique is what produced the 30 million year age of the MGI.

Unfortunately, applying a similar technique to moon rocks produced a very different date: between 50 and 150 million years after the formation of the solar system. A different isotope system (Rb-Sr) also produced a later date of formation.

To try to sort out the discrepancies, a pair of Harvard researchers built a model of the Earth's formation, one that included accretion from collisions of small bodies as well as a single giant impact. It handled thermodynamic mixing, redox reactions among metals, and tracked the growing body's iron content, along those of other minerals. They then played around with the timing of events: how rapidly accretion occurred, when it stopped, and how long after that the MGI occurred. "To be considered successful," they write, "a model of Earth’s accretion must satisfy the present isotopic composition of the Earth’s mantle." In other words, they tested different timelines to determine whether any of them could produce a model Earth that actually looks like our current one.

Their model indicates that the distribution of minerals we see wouldn't have occurred unless the Earth was thoroughly mixed through the formation of a planet-wide magma ocean. Fortunately, the collision with the Moon did just that.

The standard model of Moon formation, with a collision at around 30 million years after the formation of the solar system, is possible in their models. A later one, however, is also possible - their models could work with the formation of the Moon being as late as 100 million years post-formation. However, to get that to work, the Earth had to be put together very quickly - accretion of material would have had to be complete by about 11 million years. There are a range of possible alternatives between the two, but the trend is clear: the later the MGI, the earlier the Earth had to have formed.

All of this, however, is meant to match the model results with the Earth's composition. Recent evidence (probably published after this paper was in the works), has suggested that some of the Earth's minerals were deposited by meteors after the MGI took place. That, in turn, would suggest that the modern crust might not be what they should be aiming for in their models.

In any case, the model at least suggests that there may be a fairly broad range of ages that are compatible with the formation of the Moon. It may take real-world data to eventually sort out which of these dates is likely to be the correct one. *PNAS, 2011. DOI: 10.1073/pnas.1108544108 (About DOIs).*

http://www.physorg.com/news/2011-10-group-ancient-deep-sea-mud.html

## Research group finds ancient deep sea mud volcano as possible site for origin of life

***An international consortium of scientists and researchers has been studying some ancient rocks found on the southwestern coast of Greenland.***

PhysOrg.com - They believe the rocks were once part of a deep sea mud volcano, similar to those found today near the Mariana Islands in the Pacific Ocean and that they were likely part of an environment conducive to the synthesis of amino acids, which are believed to be necessary for life. What's most intriguing about them though is that their age indicates that they are from roughly the same time period as what is thought by many scientists to be when the first living creatures appeared here on Earth; i.e. some four billion years ago. The group has published its findings in the Proceedings of the National Academy of Sciences.

Deep sea mud volcanoes, unlike those that grow to form islands, tend to be much cooler than other volcanoes (and deep sea hydrothermal vents) due to the cool ocean temperatures in which they exist. It's for this reason that many scientists consider them ideal environments for the beginning of life. Any new life that arose would need a consistently warm environment, but one that also didn't get too hot. Also helpful would be an environment that is alkaline, rather than acidic (unlike hydrothermal vents). Deep sea mud volcanoes appear to fit the bill.

In studying the rocks, the team found that they were once saturated with reasonably warm alkaline fluids that had a lot of carbonates. Such fluids can be found today in existing deep sea mud volcanoes such as those near the Mariana Islands, which the researchers say would have been very nearly the perfect environment for the continued existence of newly formed living creatures. Because of this, the team believes that similar mud volcanoes existed off the coast of Greenland around the time that life was getting started, and if so, the area would have made an exceptionally good place for life to not only get going, but for it to thrive.

Deep sea mud volcanoes are rather rare today, but many scientists believe they were more abundant billions of years ago when oceans covered more of the Earth's surface. And of course, finding an environment conducive to supporting life once it's been started, still doesn't explain how it got started in the first place.

*More information: Early Archean serpentine mud volcanoes at Isua, Greenland, as a niche for early life, PNAS, Published online before print October 17, 2011, doi: 10.1073/pnas.1108061108 via Livescience*

**Abstract**

*The Isua Supracrustal Belt, Greenland, of Early Archean age (3.81–3.70 Ga) represents the oldest crustal segment on Earth. Its complex lithology comprises an ophiolite-like unit and volcanic rocks reminiscent of boninites, which tie Isua supracrustals to an island arc environment. We here present zinc (Zn) isotope compositions measured on serpentinites and other rocks from the Isua supracrustal sequence and on serpentinites from modern ophiolites, midocean ridges, and the Mariana forearc. In stark contrast to modern midocean ridge and ophiolite serpentinites, Zn in Isua and Mariana serpentinites is markedly depleted in heavy isotopes with respect to the igneous average. Based on recent results of Zn isotope fractionation between coexisting species in solution, the Isua serpentinites were permeated by carbonate-rich, high-pH hydrothermal solutions at medium temperature (100–300 °C). Zinc isotopes therefore stand out as a pH meter for fossil hydrothermal solutions. The geochemical features of the Isua fluids resemble the interstitial fluids sampled in the mud volcano serpentinites of the Mariana forearc. The reduced character and the high pH inferred for these fluids make Archean serpentine mud volcanoes a particularly favorable setting for the early stabilization of amino acids.*

http://medicalxpress.com/news/2011-10-forgetting-is-part-of-remembering.html

## Forgetting is part of remembering

***It's time for forgetting to get some respect, says Ben Storm, author of a new article on memory in Current Directions in Psychological Science, a journal of the Association for Psychological Science.***

"We need to rethink how we're talking about forgetting and realize that under some conditions it actually does play an important role in the function of memory," says Storm, who is a professor at the University of Illinois at Chicago. "Memory is difficult. Thinking is difficult," Storm says. Memories and associations accumulate rapidly. "These things could completely overrun our life and make it impossible to learn and retrieve new things if they were left alone, and could just overpower the rest of memory," he says.

But, fortunately, that isn't what happens. "We're able to get around these strong competing inappropriate memories to remember the ones we want to recall." Storm and other psychological scientists are trying to understand how our minds select the right things to recall - if someone's talking about beaches near Omaha, Nebraska, for example, you will naturally suppress any knowledge you've collected about Omaha Beach in Normandy.

In one kind of experiment, participants are given a list of words that have some sort of relation to each other. They might be asked to memorize a list of birds, for example. In the next part of the test, they have to do a task

that requires remembering half the birds. "That's going to make you forget the other half of the birds in that list," Storm says. That might seem bad - it's forgetting. "But what the research shows is that this forgetting is actually a good thing."

People who are good at forgetting information they don't need are also good at problem solving and at remembering something when they're being distracted with other information. This shows that forgetting plays an important role in problem solving and memory, Storm says.

There are plenty of times when forgetting makes sense in daily life. "Say you get a new cell phone and you have to get a new phone number, do you really want to remember your old phone number every time someone asks what your number is?" Storm asks. Or where you parked your car this morning - it's important information today, but you'd better forget it when it comes time to go get your car for tomorrow afternoon's commute. "We need to be able to update our memory so we can remember and think about the things that are currently relevant." *Provided by Association for Psychological Science*

***http://medicalxpress.com/news/2011-10-21st-century-database-traditional-chinese.html***

## 21st century database of traditional Chinese medicine released

***A comprehensive database developed by King's College London researchers that features the chemical components found in traditional Chinese medicines has been released to market this month, allowing researchers to explore age-old remedies in the search for tomorrow's new drugs.***

Provided under licence to Tim Tec LLC, a US-based life science company, the 'Chem-TCM' database is the most comprehensive of its kind. Featuring over 12,000 chemicals found in plants used in Chinese medicine, the database provides a valuable research tool for the pharmaceutical and biotechnology industries, academic researchers, and the medical profession (including the complementary health sector).

Part-funded by Innovation China UK (ICUK), the database has been developed through collaboration between researchers in the Institute of Pharmaceutical Science at King's, Dr David Barlow, Dr Thomas Ehrman and Professor Peter Hylands, and the Shanghai Institute of Materia Medica (SIMM).

To create the Chem-TCM database, the King's researchers analysed patterns in the known and predicted biological activities of 12,000 chemicals from over 300 Chinese herbs in relation to their usage in traditional Chinese medicine. Their results reveal that many categories in Chinese medicine are translatable into Western terminology.

Dr David Barlow said: 'Traditional Chinese medicine has undergone a remarkable renaissance in recent years. However, the unique language used to describe categories of medicines has hindered effective understanding of one of the most developed and mature systems of alternative medicine in existence.

'With the Chem-TCM database, future researchers will now be better able to understand the chemical basis of remedies that have been in use for thousands of years. This is likely to be of benefit both in the search for new drugs and, equally significantly, in understanding how Chinese medicine works.' Chem-TCM features four major parts: chemical identification, botanical information, predicted activity against Western therapeutic targets, and estimated molecular activity according to traditional Chinese medicine categories.

Dr. Marat Niazoff, CEO of TimTec LLC, said: 'This database is a comprehensive attempt to link Chinese and Western medicine on the molecular level. It is a great contribution to the further study of natural products and their pharmacological potential. The database gathers diverse structural material and a wealth of phytochemical information, opening new possibilities for virtual screening in particular.'

Manyi Cristofoli, Director of ICUK, said: 'I am pleased another ICUK-funded proof-of-concept project has now been commercialised in the pharmaceutical industry – this is a very good example of how academia and industry can successfully collaborate for innovation at a truly international level. The partnership with TimTec opens up a new global channel to jointly realise the wide potential in traditional Chinese medicine.'

*Provided by King's College London*

***http://www.eurekalert.org/pub_releases/2011-10/fsu-cac101811.php***

## Cells are crawling all over our bodies, but how?

***Biologists at Florida State devise new way to watch how cells move***

For better and for worse, human health depends on a cell's motility - the ability to crawl from place to place. In every human body, millions of cells –are crawling around doing mostly good deeds - though if any of those crawlers are cancerous, watch out.

"This is not some horrible sci-fi movie come true but, instead, normal cells carrying out their daily duties," said Florida State University cell biologist Tom Roberts. For 35 years he has studied the mechanical and molecular means by which amorphous single cells purposefully propel themselves throughout the body in amoeboid-like fashion - absent muscles, bones or brains.

Meanwhile, human cells don't give up their secrets easily. In the body, they use the millions of tiny filaments found on their front ends to push the front of their cytoskeletons forward. In rapid succession the cells then retract their rears in a smooth, coordinated extension-contraction manner that puts inchworms to shame. Yet take them out of the body and put them under a microscope and the crawling changes or stops.

But now Roberts and his research team have found a novel way around uncooperative human cells.

In a landmark study led by Roberts and conducted in large part by his then-FSU postdoctoral associate Katsuya Shimabukuro, researchers used worm sperm to replicate cell motility in vitro - in this case, on a microscope slide.

Doing what no other scientists had ever successfully done before, Shimabukuro disassembled and reconstituted a worm sperm cell, then devised conditions to promote the cell's natural pull-push crawling motions even in the unnatural conditions of a laboratory. Once launched, the reconstituted machinery moved just like regular worm sperm do in a natural setting - giving scientists an unprecedented opportunity to watch it move.

Roberts called his former postdoc's signal achievement "careful, clever work"- and work it did, making possible new, revealing images of cell motility that should help to pinpoint with never-before-seen precision just how cells crawl.

"Understanding how cells crawl is a big deal," Roberts said. "The first line of defense against invading microorganisms, the remodeling of bones, healing wounds in the skin and reconnecting of neuronal circuits during regeneration of the nervous system - all depend on the capacity of specialized cells to crawl. "On the downside, the ability of tumor cells to crawl around is a contributing factor in the metastasis of malignancies," he said. "But we believe our achievements in this latest round of basic research could eventually aid in the development of therapies that target cell motility in order to interfere with or block the metastasis of cancer."

Funding for Robert's worm-sperm study came from the National Institutes of Health. The findings are described in a paper ("Reconstitution of Amoeboid Motility In Vitro Identifies a Motor-Independent Mechanism for Cell Body Retraction") published online in the journal Current Biology.

**Why worm sperm?**

For one thing, said Roberts, the worm sperm is different from most cells in that it doesn't use molecular motor proteins to facilitate its contractions; it shimmies along strictly by putting together and tearing down its tiny filaments. And the simple worm sperm makes a good model because, while it is similar to a human cell it has fewer moving parts, making it less complicated to take apart and reassemble than, say, brain or cancer cells.

Armed with the newfound ability to reconstitute amoeboid motility in vitro, cell biologists such as Roberts may be able to learn the answers to some major moving questions. Among them: How can some cells continue to crawl even after researchers have disabled their supply of myosin, the force-producing "mover protein" that functions like a motor to help power muscle and cell contraction?

For Roberts and his team, the next move will be to determine if what they've learned about worm sperm also applies to more conventional crawling cells, including tumor cells.

"As always, there will be more questions," Roberts said. "Are there multiple mechanisms collaborating to drive cell body retraction? Is there redundancy built into the motility systems?"

*Co-authors of the Current Biology paper include Roberts, a professor in the FSU Department of Biological Science; Shimabukuro, a former FSU postdoctoral associate in biology who now is a research scientist at the Japan Science and Technology Agency; Naoki Noda, of the Marine Biological Laboratory at Woods Hole, Mass.; and Murray Stewart, of the Medical Research Council's Laboratory of Molecular Biology in Cambridge, England.*

***http://www.sciencedaily.com/releases/2011/10/111018084639.htm***

## Tricking Resistant Cancer Cells Into Committing Suicide

***Oncolytic virology uses live viruses to sense the genetic difference between a tumor and normal cell.***

ScienceDaily - Once the virus finds a tumor cell, it replicates inside that cell, kills it and then spreads to adjacent tumor cells to seed a therapeutic "chain reaction." As reported in the October 18 issue of Cancer Cell, Dr. David Stojdl, a scientist from the Children's Hospital of Eastern Ontario Research Institute at the University of Ottawa has found a way to trick resistant cancer cells into committing suicide following oncolytic virus therapy.

When it comes to using oncolytic viruses to fight cancer, the outcome is a consequence of a battle between the genes that the virus has and the genes that the human host has. Using a technology called RNA Interference (RNAi) Dr. Stojdl's research team was able to systematically search through the entire human genome to find genes [that when inhibited] would make the viruses up to 10,000 times more potent at killing tumor cells without harming healthy cells. "Until now, scientists in our field have been focused on engineering the genes in the oncolytic virus itself to make them work better, and that has worked well to a point. This is the first study to

look at all of the genes in the human genome to determine which ones we should manipulate to help the oncolytic therapy work better," said Dr. Stojdl.

Dr. Stojdl's research team has identified a series of genes that magnify the impact of oncolytic viruses. These genes normally control the endoplasmic reticulum stress response, or unfolded protein response. In essence, when the cell environment is toxic the cells have a tough time folding proteins. "A properly folded protein doesn't expose many sticky parts on its surface. Cells don't like mangled proteins because they get sticky. If you have sticky parts they combine with other proteins to make large, toxic 'balls' of protein - and this can kill the cell," explained Dr. Stojdl in layman terms.

"To deal with this 'sticky situation', the cell turns on a few pre-programmed rescue systems that either turbocharge the folding process or slow down the production of new proteins until the cell can catch up. If this doesn't work, the cell commits suicide to stop the damage from spreading," explained Dr. Douglas Mahoney lead author of the study and member of the Stojdl lab.

Dr. Stojdl's team has identified a way to short-circuit these rescue systems so that tumor cells go straight to suicide and healthy cells stay intact. The strategy works by applying a mild stress to the cells to force them to turn on these rescue systems. But when these cells encounter an oncolytic virus, instead of trying to fix the unfolded proteins, the cell is triggered to commit suicide. This triggering effect also works with some common chemotherapeutics that are used in cancer clinics around the world today.

*The funding partners for this research include: Terry Fox Foundation; Ottawa Regional Cancer Foundation; Angels of Hope; CHEO Foundation and Canada Foundation for Innovation.*

***http://www.scientificamerican.com/article.cfm?id=engineer-turns-wood-into-oil***

## Engineer Turns Wood into Oil, in 2 Simple Steps

***Efficiency and simplicity have long eluded renewable-fuel researchers, but a Maine scientist has developed a two-step process he says can make oil from the cellulose in wood fiber.***

**By Ernest Scheyder**

ORONO, Maine (Reuters) - Efficiency and simplicity have long eluded renewable-fuel researchers, but a Maine scientist has developed a two-step process he says can make oil from the cellulose in wood fiber.

This process, far less complex than competing methods, creates an oil that can be refined into gasoline, jet fuel or diesel and removes nearly all oxygen - the enemy of fuel efficiency.

"It's unique and it's simple," said Clay Wheeler, the University of Maine chemical engineering professor who discovered the process last year with two undergraduates. "This is important because the more complex the technology, the more expensive it's going to be."

In heavily wooded Maine, logging produces a lot of scrap tree stumps, tops and branches that are unusable for making lumber or paper. While additional research is needed, if Wheeler's process is ultimately able to be commercially developed, it could help forest-rich states generate their own fuel from that scrap.

For a video on the process, click on: http://link.reuters.com/vak54s

In the first step of Wheeler's process, wood is bathed in sulfuric acid, isolating the sugars in cellulose and producing an energy-intense organic acid mixture. That mixture is then heated with calcium hydroxide in a reactor to 450 degrees Celsius (840 Fahrenheit), a step that removes oxygen. What drips out is a hydrocarbon liquid that chemically mimics crude oil.

For every ton of cellulose processed, Wheeler is able to make about 1.25 barrels of oil equivalent, a unit of energy comparable to the amount of energy produced by burning one barrel of crude oil. The acids and calcium hydroxide are recycled at the end of the process, cutting costs, he said.

The most expensive part is the wood itself, Wheeler said. At current wood biomass prices, he acknowledged his process is not economically competitive with traditional crude oil refining. "But we anticipate that the value of the fuel will continue to increase as petroleum becomes more scarce," he said.

The economic viability of the project is a source of concern, said Andrew Soare, an analyst who tracks alternative fuel technologies at Lux Research, a technology advisory firm. "Further understanding of costs is key to this reaction," Soare said. "I think this process certainly does have a chance to go somewhere."

Paul Bryan, program manager at the U.S. Department of Energy's Biomass Program, said a project's economics are a key factor for any future funding support. "If the outputs are a lot more valuable than the inputs, that's the first step to success," he said. The journal Green Chemistry plans to publish a study later this year on Wheeler's process, which does not use catalysts or bacteria as most other alternative fuel methods do.

Wheeler is now studying just what makes his process tick. He accidentally stumbled upon it 11 months ago while trying different reactions with biomass and acids. He does not know exactly what happens inside the reactor during the second phase, when the oil is actually produced, but he knows what he can make with it.

During a recent tour of his Maine laboratory, Wheeler refined his fuel into gasoline that can be used in existing engines. "We've had independent laboratories test this, and without any upgrading, it was 82-octane gasoline," Wheeler said. That is a lower octane rating than you find at gas stations - most are at least 87 - but traditional crude oil refining uses several steps to reach that mark. "We think we can get there," Wheeler said of the higher octane rating.

**NEW INNOVATIONS AND PRODUCTS**

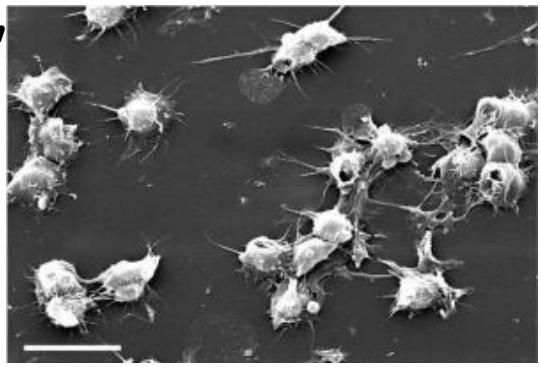
Even though the United States has 10 percent of the world's forest land, its pulp and paper industry has slowly declined in the past 50 years due to shrinking paper demand.

In August, paper shipments fell 6.4 percent from the same month last year and box production slipped 2.7 percent, according to the American Forest and Paper Association.

***http://www.sciencedaily.com/releases/2011/10/111018211341.htm***

## Heart Disease Linked to Evolutionary Changes That May Have Protected Early Mammals from Trauma

***A new study suggests that cardiovascular disease may be an unfortunate consequence of mammalian evolution***



ScienceDaily - Can a bird have a heart attack? A new study by researchers at the Perelman School of Medicine at the University of Pennsylvania suggests that cardiovascular disease may be an unfortunate consequence of mammalian evolution. The study, published in a recent issue of the journal Blood, demonstrates that the same features of blood platelets that may have provided an evolutionary advantage to early mammals now predispose humans to cardiovascular disease.

***Scanning electron microscopy of bird thrombocytes adhering to collagen under high flow. Notice the cells are larger, have a large hump which is due to the nucleus and do not form 3-dimensional aggregates.*** **Penn Medicine**

"The biology of platelets has been studied in great detail in the context of human disease, but almost nothing is known about why mammals have platelets, whereas no other species do," said lead study author Alec A. Schmaier, PhD, an MD/PhD student in the lab of Mark Kahn, MD, professor of Medicine at Penn. "This new line of research suggests that platelets could have allowed mammals to better survive traumatic injury by being able to form cellular clots in arterial blood vessels. The price for this evolutionary change may be modern cardiovascular diseases."

Platelets are small circulating cells that have no nucleus and form clots at sites of vessel injury. Platelets are required to prevent excessive bleeding following traumatic injury, but they also form clots at sites of atherosclerotic plaques in the blood vessels that lead to stroke and heart attack. Drugs that inhibit the function of platelets, including aspirin and clopidogrel, are the main weapons for treating heart attack and stroke.

Despite being a vital element of the blood clotting system, platelets are only found in mammals, whereas all non-mammalian vertebrates, including birds, have thrombocytes. About twice the diameter of platelets, thrombocytes contain a nucleus. Studies performed in the 1970s suggested they have a clotting function similar to platelets, but extensive studies of thrombocytes using modern experimental techniques have not been performed.

The research team focused their study on birds (compared to fish or reptiles for example) because birds and mammals both have a high pressure arterial system. Birds in fact have higher cardiac output and blood pressures than mammals do. Therefore, the challenge for hemostasis, i.e. blood clotting after vessel injury or trauma, should be similar between a mammal and a bird. However, in the present study, using molecular and physiologic techniques, the Penn researchers discovered that avian thrombocytes express most of the same proteins as platelets, with two key exceptions: thrombocytes express a significantly lower level of one essential platelet protein (the fibrinogen receptor) and are completely deficient in another (the adenosine diphosphate receptor) that function in a pathway required to form occlusive clots in the arterial system and are the primary targets of anti-platelet medications. In collagen flow-chamber experiments, the research team found that thrombocytes could not form 3-dimensional aggregates under high-flow conditions, a key step in the pathogenesis of stroke and heart attack.

Collaborative studies with colleagues at Penn's School of Veterinary Medicine, Karen Rosenthal, DVM, MS, and Jeff Runge, DVM, and Tim Stalker, in Department of Medicine -Hematology/Oncology, at the Perelman School of Medicine, next compared the ability of platelets and thrombocytes to form intra-vascular clots in mice and similarly sized parakeets. The mice, but not the birds, developed clots that prevented blood flow after

arterial injury due to the ability of platelets, but not thrombocytes, to stick to each other under high flow conditions.

Although the researchers caution that this prediction cannot be tested in all contexts, the finding that equivalent degrees of arterial vessel wall injury in vessels of similar size and equal hemodynamic forces result in the occlusion in mammals but not in birds is consistent with the hypothesis that platelets mediate a more efficient clotting response than thrombocytes.

Dr. Kahn, the study's senior author, concluded, "Although the reason for platelet evolution in mammals can never be known with certainty, it is tempting to speculate that platelets may have allowed early mammals to better survive trauma and thereby provided a survival advantage." The research was supported by National Institute of Health and by an American Heart Association (AHA) postdoctoral fellowship.

***http://www.eurekalert.org/pub_releases/2011-10/uota-slp101911.php***

## Study links pollutants to a 450 percent increase in risk of birth defects

### *Many other congenital conditions, including autism, may one day prove to be related to environmental pollutants*

AUSTIN, Texas - Pesticides and pollutants are related to an alarming 450 percent increase in the risk of spina bifida and anencephaly in rural China, according to scientists at The University of Texas at Austin and Peking University. Two of the pesticides found in high concentrations in the placentas of affected newborns and stillborn fetuses were endosulfan and lindane. Endosulfan is only now being phased out in the United States for treatment of cotton, potatoes, tomatoes and apples. Lindane was only recently banned in the United States for treatment of barley, corn, oats, rye, sorghum and wheat seeds.

Strong associations were also found between spina bifida and anencephaly and high concentrations of polycyclic aromatic hydrocarbons (PAHs), which are byproducts of burning fossil fuels such as oil and coal. Spina bifida is a defect in which the backbone and spinal canal do not close before birth. Anencephaly is the absence of a large part of the brain and skull.

"Our advanced industrialized societies have unleashed upon us a lot of pollutants," says Richard Finnell, professor of nutritional sciences and director of genomic research at the Dell Children's Medical Center of Central Texas. "We've suspected for a while that some of these pollutants are related to an increase in birth defects, but we haven't always had the evidence to show it. Here we quite clearly showed that the concentration of compounds from pesticides and coal-burning are much higher in the placentas of cases with neural tube defects than in controls."

The study, which was published in August in the Proceedings of the National Academy of Sciences, is the result of a more than decadelong collaboration between Finnell and a team of researchers in Shanxi, a province in northern China.

Finnell sought collaborators in China because the prevalence of neural tube defects is much greater there than it is in the United States. Also, because of its population policies, China is good at tracking births.

"It's an extraordinary natural experiment," says Finnell, who was recently recruited to the university to help anchor the Dell Pediatric Research Institute. "It would be much harder to do this study in the United States, where neural tube defects are more rare. It's also an opportunity to assist the Chinese government in their efforts to lower their birth defect rates."

Working with public health officials in four rural counties in Shanxi, researchers collected placentas from 80 newborn or stillborn fetuses that suffered from spina bifida or anencephaly. Once a fetus or a newborn with such defects was identified as a case, the placenta of a healthy newborn with no congenital malformations born in the same hospital was selected as a control.

Finnell and his colleagues screened these placentas for the presence of a class of substances known as persistent organic pollutants (POPs). Common POPs include agricultural pesticides, industrial solvents and the byproducts of burning fuels such as oil and coal. They found strong associations between the birth defects and high levels of a number of compounds present in commonly used pesticides. They also found elevated placental concentrations of PAHs. "This is a region where they mine and burn a lot of coal," says Finnell. "Many people cook with coal in their homes. The air is often black. You don't need to be a rocket scientist to say that maybe there's something in there that isn't good for babies."

Finnell says although the environmental conditions in Shanxi are dramatically worse than they are in most areas of the United States, they are comparable to what the United States was like a century ago, and the neural tube defects are not solely a Chinese problem. Every year approximately 3,000 pregnancies in the United States are complicated by neural tube defects. Many other congenital conditions, including autism, may one day prove to be related to environmental pollutants.

"Ultimately you need enough cells to make a proper, healthy baby," says Finnell, "and these are the types of compounds that cause cell death. At the most basic level, we're learning that environmental things kill cells, and if that occurs in a critical progenitor population at a crucial time, you're going to have problems."

***http://www.scientificamerican.com/article.cfm?id=preliminary-human-experiments-test-safety-paralysis-treatment-nerve-cells***

## Preliminary Human Experiments to Test Safety of Nerve Cell Transplants for Spinal Cord Paralysis

***The new approach, currently being studied by the FDA for phase I trials, avoids the problems of immunological rejection and the controversy around the use of embryonic stem cells***

**By R. Douglas Fields | Wednesday, October 19, 2011 | 1**

ROCKVILLE, Md. - A new experiment aimed at achieving actor Christopher Reeve's dream of finding an effective treatment for spinal paralysis was announced this week at an international meeting of scientists and people with spinal cord injury sponsored by the United 2 Fight Paralysis Foundation. The approach, which already is shown to be promising in animals and avoids the need for patients to take immunosuppressive drugs, has not yet been proved effective in humans. Nonetheless, patients are excited to see this advance as they have been frustrated waiting for the first human trials of the new approach.

W. Dalton Dietrich, scientific director of The Miami Project to Cure Paralysis at the University of Miami Miller School of Medicine, announced here that his research team has submitted an application to the U.S. Food and Drug Administration (FDA) for permission to begin new "phase I" experiments on humans to treat paralysis using the new cell transplantation technique. (Phase I trials have nothing to do with efficacy. They are only to test safety and typically a nontherapeutic dose is used at the outset of the safety studies.) With the new technique, rather than using cells derived from embryonic stem cells, the patient's own mature cells are harvested from a nerve in the leg and grown in large numbers in the laboratory, then transplanted back into the injured spinal cord to repair damage. This approach avoids the problems of immunological rejection and the controversy that can arise from using cells derived from embryonic stem cells for treating neurological injury and disease. Typically, patients receiving an organ or tissue transplant from a donor must be given immunosupressant drugs to prevent their immune systems from attacking the foreign tissue.

The cells being used for transplantation are Schwann cells, a type of non-neuronal cell (glia) that protects and insulates nerve fibers running through the body's limbs and trunk. Schwann cells also support the repair of damaged neurons; they provide vital proteins that protect nerve cells after injury, coax new nerve sprouts (axons) to grow and reconnect with the proper structures, and wrap electrical insulation, myelin, around the fibers, which is essential for axons to conduct electrical impulses. Unlike damage to the spinal cord, an injured nerve in the body can repair itself.

Schwann cells are not present in the brain and spinal cord. Instead, a different cell called an oligodendrocyte forms the myelin insulation. This century-old observation was an important clue in answering the question of why a damaged nerve in the body's peripheral nervous system heals over time, but a damaged axon in the brain or spinal cord (central nervous system, or CNS) does not. Research transplanting Schwann cells into the damaged brain and spinal cord of experimental animals in the 1980s showed that neurons in the CNS could grow and repair damaged connections if Schwann cells were transplanted to support and guide them. This finding has been replicated in numerous studies in a wide range of animals. The cellular environment in the central nervous system is the reason that spinal cord injury results in permanent paralysis, not a weakness of the neurons themselves in recovering from damage.

"This is great news - very exciting," says Martin Codyre, of Greystones, Ireland, "but I am frustrated because this [experiments in humans] should have happened 15 years ago." Codyre, who suffered a broken neck in a fall three years ago, has educated himself on the neuroscience of spinal cord injury and become an advocate for research to find a cure. "People in wheelchairs are going all over the world to get things [transplants] done in places like China, without knowing what they are getting - it's risky," he says, criticizing the slow pace of bringing research on experimental animals to experiments in humans. "People are desperate. They are dying in their chairs." There are no cell transplantation therapies approved for treating patients for spinal cord injuries, but phase I trials were approved recently by the FDA to permit a biotech company, Geron Corp., to begin testing the safety of transplanting cells derived from embryonic stem cells (oligodendrocyte progenitor cells) into spinal cord injury patients last October. Transplantation of a different type of cell into the spinal cord that is derived from embryonic stem cells is being tested by Neuralstem, Inc. for safety in treating patients with amyotrophic lateral sclerosis (ALS). Safety concerns are greater with stem cell-based therapy, because unlike a

drug, foreign cells transplanted into a patient's body cannot be removed, and some fear the possibility that they could form tumors.

Even with the option of transplanting cells derived from embryonic stem cells now under investigation for safety, the treatment horizon for people who are paralyzed has been bleak. Some patients are reluctant to consider stem-cell based transplantation to treat their paralysis because of the possible risks. Paralysis often prevents people from breathing and voiding urine normally, making them more susceptible to respiratory and urinary infections and thereby increasing the need to rely on antibiotics. "I would be concerned about immune suppression," says Jean-Guy Niquet, of Montreal, who has been paralyzed for 28 years. "UTI's (urinary tract infections) can be life-threatening for us." No immunosuppressive drugs would be required for Schwann cell transplants, because the cells are from the patient's own body.

At this point, human studies are needed to answer the question of safety of both Schwann cell and embryonic stem cell-derived transplants into the spinal cord before undertaking studies of efficacy. Joseph Gold, senior director of neurobiology and cell therapies at Geron, and Richard Garr, CEO and director of Neuralstem, Inc, each using different types of embryonic stem cell-based therapies for spinal cord transplantation, reported at the same meeting that results thus far show that immunological suppression can be managed without any complications. The approaches of both companies are very effective in laboratory animals, and the use of embryonic stem cells for curing disease is becoming more widely accepted on ethical grounds.

Other researchers and patients at the meeting expressed frustration that it has taken so long to begin studies using the Schwann cell transplantation approach in humans, because the technique is backed by years of research on experimental animals showing that it is effective in restoring sensory and motor function.

***http://medicalxpress.com/news/2011-10-common-link-autism-diabetes.html***

## Research proposes common link between autism, diabetes

***A review of the genetic and biochemical abnormalities associated with autism reveals a possible link between the widely diagnosed neurological disorder and Type 2 diabetes, another medical disorder on the rise in recent decades.***

"It appears that both Type 2 diabetes and autism have a common underlying mechanism - impaired glucose tolerance and hyperinsulinemia," said Rice University biochemist Michael Stern, author of the opinion paper, which appears online in this month's issue of Frontiers in Cellular Endocrinology.

Hyperinsulinemia, often a precursor to insulin resistance, is a condition characterized by excess levels of insulin in the bloodstream. Insulin resistance is often associated with both obesity and Type 2 diabetes.

"It will be very easy for clinicians to test my hypothesis," said Stern, professor of biochemistry and cell biology at Rice. "They could do this by putting autistic children on low-carbohydrate diets that minimize insulin secretion and see if their symptoms improve." Stern said the new finding also suggests that glucose tolerance in pregnant women may need to be addressed more seriously than it is now.

Stern said he first realized there could be a common link between Type 2 diabetes and autism a few years ago, but he assumed someone else had already thought of the idea.

Stern's lab, which is located at Rice's BioScience Research Collaborative, specializes in investigating the genetic interactions associated with genetic diseases like neurofibromatosis, a disorder in which patients are several times more likely to be afflicted with autism and autism spectrum disorders (ASD) like Asperger's syndrome.

Autism and ASD are neurological disorders that have a strong but poorly understood genetic basis. The U.S. Centers for Disease Control and Prevention estimates that about nine out of 1,000 U.S. children are diagnosed with ASD.

Stern said at least four genes associated with increased frequency in autism are known to produce proteins that play key roles in a biochemical pathway known as PI3K/Tor. Stern said he had been studying a form of abnormal function in the synapses of fruit flies that was remarkably similar to abnormalities observed in rats and mice with defects in a different pathway known as mGluR-mediated long-term depression.

"I had also spent a lot of time thinking about insulin signaling because another project in my lab is an endocrinology project in which we're studying how key proteins involved in insulin signaling affect the timing of metamorphosis in fruit flies," Stern said.

From his studies in both areas, Stern knew two things: PI3K/Tor was the major pathway for insulin signals within cells, and insulin could affect synapses in a remarkably similar way to the mGluR defects associated with autism. "When I read that the incidence of autism was increasing, and combined that with the fact that the incidence of Type 2 diabetes is also increasing, it seemed reasonable that each increase could have the same ultimate cause - the increase in hyperinsulinemia in the general population," Stern said. "I didn't do anything

with this notion for a few years because it seemed so obvious that I figured everyone already knew this hypothesis, or had tested it and found it was not true."

Stern said he changed his mind a few months ago when a health care consulting firm asked him to provide input about autism.

"In preparing for this interview, I discovered that gestational diabetes was the most important identified maternal risk factor for autism, but that 'no known mechanism could account for this,'" Stern recalled. "When I read this, I was speechless. That's when I realized that this was not obvious to others in the field, so I decided to write this up with the hope that clinicians might become aware of this and treat their patients accordingly."

In writing the article, Stern said he learned that the role of insulin in cognitive function is becoming more widely accepted.

"I was checking to see if insulin was known to affect synaptic function, and I learned that the nasal application of insulin is already being tested to see if it is beneficial for both Alzheimer's and schizophrenia."

Stern said he also found preliminary studies that indicated that low-carb diets were therapeutic for some individuals with autism and ASD.

"Based on what's already in the literature, insulin needs to be taken seriously as a causative element in autism," Stern said. "I hope that clinicians will take the next step and put this to a rigorous test and determine how to best use this information to benefit patients."

*More information: The opinion article is available at:* ***http://www.frontiersin...00054/full***

***http://www.scientificamerican.com/article.cfm?id=longevity-inheritance-epigenetics***

## Longevity Shown for First Time to Be Inherited via a Non-DNA Mechanism

***Experiments with worms show that altering an enzyme can not only lengthen their life spans, but that the longevity effect can be carried across several generations***

**By Sarah Fecht | Wednesday, October 19, 2011 | 4**

In October 2009 Stanford University geneticist Anne Brunet was sitting in her office when graduate student Eric Greer came to her with a slightly heretical question. Brunet's lab had recently learned that they could lengthen a worm's lifetime by manipulating levels of an enzyme called SET2. "What if extending a worm's lifetime using SET2 can affect the life span of its descendants, even if the descendants have normal amounts of the enzyme?" he asked.

The question was unorthodox, Brunet says, "because it touches upon the Lamarckian idea that you can inherit acquired traits, which biologists have believed false for years." The biologist Jean-Baptiste Lamarck theorized in 1809 that the traits exhibited by an organism during its lifetime were augmented in its offspring; a giraffe that regularly stretched its neck to eat would father calves whose necks were longer. The idea was largely discredited by Darwin's theory of evolution, first published in 1859. More recently, scientists have begun to realize that an organism's behavior and environment may indeed influence the genes it passes to its offspring. The heritability of those acquired traits is not based on DNA, but on alterations in the molecular packaging that surrounds a gene. When Greer approached Brunet in 2009 with his question about worms and SET2, such "epigenetic" inheritance had only been discovered for simple traits such as eye color, flower symmetry and coat color.

Brunet and Greer went ahead with the experiment. The results, published October 19 in Nature, provide the first evidence that some aspects of longevity can be passed from parent to offspring, independent of DNA's direct influence. (Scientific American is part of Nature Publishing Group.)

"I think this is a fundamentally important finding," says Matt Kaeberlein of the University of Washington in Seattle, who studies molecular mechanisms of aging. "It demonstrates for the first time that aging can be influenced by epigenetic changes that occurred in prior generations."

The study used Caenorhabditis elegans worms with very low levels of SET2. The enzyme normally adds methyl molecules onto DNA's protein packaging material. In doing so, the enzyme opens up the packaging material, allowing the genes to be copied and expressed. Some of those genes appear to be pro-aging genes, Brunet says. Her team knocked out SET2 by removing genes that code for it. This had the effect of significantly lengthening the worms' life spans, presumably because those pro-aging genes were no longer expressed.

Next, the long-lived, enzyme-lacking worms mated with normal ones. The offspring had the regular genes for making SET2, and even expressed normal amounts of the enzyme, but they lived significantly longer than control worms whose parents both had regular life spans. The life-extending effect carried over into the third generation, but returned to normal by the fourth generation (in the great-grandchildren of the original mutant worms). For the first few generations, having a long-lived ancestor increased life expectancy from 20 days to 25, extending a worm's longevity by 25 to 30 percent on average.

Brunet and her team have not yet determined the exact mechanism for the lifetime extension, or which molecules are at work. This is one of the study's imperfections, says David Katz, who researches epigenetic transcriptional memory at Emory University. Regardless, "the effect is clearly epigenetic," he says, "and it's probably one of the most complicated traits that has been linked to epigenetic inheritance."

The knowledge that epigenetics can impact a complex trait like life span has scientists curious to find out what other kinds of traits - such as disease susceptibility, metabolism and developmental patterns - are epigenetically heritable. Because epigenetic effects can be modified by environmental stimuli, Kaeberlein points out, it is possible that some of these traits "could be determined, at least in part, by the environment and lifestyle choices of parents, grandparents or even great-grandparents."

The study's results are also exciting because the genes that code for the life-lengthening SET2 enzyme exist in other species, including humans. Brunet says she wants see if the results can be replicated in vertebrates, such as fish and mammals. Those questions will not be answered for many years, because it is unknown whether the SET2 complex has the same function in other species, and because those species have longer generational time frames.

"Worms have very short lives," Brunet says. "Will the effect apply to mammals that live thousands of times longer? We are excited to find out."

***http://news.discovery.com/space/comet-armageddon-detected-in-nearby-star-system-111019.htm***

## Comet Armageddon Detected in Nearby Star System

***A nearby star system is currently going through hell, as hinted at by NASA's Spitzer Space Telescope.***

**By Ian O'Neill**

Through its infrared eye, Spitzer has detected the dusty remains of comet impacts around the star Eta Corvi - reminding us what it must have been like during the early evolution of our own solar system.

During our solar system's "Late Heavy Bombardment" (LHB) some four billion years ago, the inner planets were constantly peppered with massive comets impacting their surfaces. Earth would have been unrecognizable - the planet's surface was a burning, molten mess; young atmosphere constantly punctuated by incoming cometary fragments.

Devoid of any eroding atmosphere, the moon's surface bears the scars of this epic cometary onslaught - huge impact craters providing a reminder of how violent the "early years" of our solar system really was.

Despite the continuous cycle of cataclysmic impact events generating a hellish cauldron on Earth, the LHB has been linked with the genesis of life - evidence points to a cometary source for the organic ingredients. Needless to say, the growing pains inflicted by the LHB on our planet is of huge importance to scientists.

Therefore, to spot the signs of similar cometary bombardments in other star systems would be pretty awesome. Not only would that help us understand the evolution of planetary systems orbiting other stars, it would provide a "time capsule" for us to have a glimpse of the early life of our own solar system. Of course, it would also give us an idea of how many other stars could be "ripe" for life (as we know it).

Now, scientists using observations by Spitzer have detected cometary Armageddon around Eta Corvi, a star some 50 light-years away in the constellation Corvus.

A ring of warm dust closely surrounds Eta Corvi, and after analysis of the dust, it appears to have the same chemistry as pulverized comets - water ice, rock and organics. This provides the hint that the star may be going through a similar phase as the early solar system - comets are careening inward, colliding with as-yet to be detected planetary bodies. The star is approximately a billion years old, an age that scientists estimate is "just right" for a cometary hailstorm to occur.

"We believe we have direct evidence for an ongoing Late Heavy Bombardment in the nearby star system Eta Corvi, occurring about the same time as in our solar system," said Carey Lisse, senior research scientist at the Johns Hopkins University Applied Physics Laboratory in Laurel, Md.

Not only does the chemical fingerprint of the debris surrounding Eta Corvi demonstrate active impacts from a huge reservoir of comets, the dust's chemistry resembles that of the Almahata Sitta meteorite, fragments of which fell to Earth in Sudan in 2008. This suggests ancient material floating around in the solar system may have a common formation process as the material getting bashed up in Eta Corvi.

The similarities don't end there. There is evidence of another, cooler dusty ring further away from the star than the cometary impact debris, approximately 150 AU (150 times the Earth-sun distance) from Eta Corvi. The ring was detected in 2005 and could be the location of cometary nuclei, asteroids and other debris. The solar system has a region at roughly the same distance - the Kuiper Belt. Could this outer, cool ring be the source of the comets currently smashing through the inner Eta Corvi system? Possibly.

This is a fascinating study as Spitzer has gleaned an insight to the nature of a star system, possibly containing several planetary bodies - after all, it was the migration of Jupiter and Saturn in the early history of the solar system that kick-started the LHB in the first place. Perhaps Eta Corvi is currently undergoing a similar process. "We think the Eta Corvi system should be studied in detail to learn more about the rain of impacting comets and other objects that may have started life on our own planet," said Lisse.

These findings have been accepted for publication in The Astrophysical Journal and were presented at the Signposts of Planets meeting at NASA's Goddard Space Flight Center in Greenbelt, Md., on Wednesday.

***http://www.sciencedaily.com/releases/2011/10/111019172103.htm***

## Solving the Mysteries of Short-Legged Neandertals

***Researchers at Johns Hopkins have found that lower leg lengths shorter than the typical modern human's let them move more efficiently over the mountainous terrain where they lived***

ScienceDaily- While most studies have concluded that a cold climate led to the short lower legs typical of Neandertals, researchers at Johns Hopkins have found that lower leg lengths shorter than the typical modern human's let them move more efficiently over the mountainous terrain where they lived. The findings reveal a broader trend relating shorter lower leg length to mountainous environments that may help explain the limb proportions of many different animals.

Their research was published online in the American Journal of Physical Anthropology and will appear in print in the November issue.

"Studies looking at limb length have always concluded that a shorter limb, including in Neandertals, leads to less efficiency of movement, because they had to take more steps to go a given distance," says lead author Ryan Higgins, graduate student in the Johns Hopkins Center of Functional Anatomy and Evolution. "But the other studies only looked at flat land. Our study suggests that the Neandertals' steps were not less efficient than modern humans in the sloped, mountainous environment where they lived."

Neandertals, who lived from 40,000 to 200,000 years ago in Europe and Western Asia, mostly during very cold periods, had a smaller stature and shorter lower leg lengths than modern humans. Because mammals in cold areas tend to be more compact, with a smaller surface area, scientists have normally concluded that it was the region's temperature that led to their truncated limbs compared to those of modern humans, who lived in a warmer environment overall.

However, Higgins' group adds a twist to this story. Using a mathematical model relating leg proportions to angle of ascent on hills, he has calculated that Neandertals on a sloped terrain would have held an advantage while moving compared to their long-legged cousins, the modern humans. Because the area Neandertals inhabited was more mountainous than where modern humans tended to live, the researchers say that this assessment paints a more accurate picture of the Neandertals' efficiency of movement as compared to humans. "Their short lower leg lengths actually made the Neandertals more adept at walking on hills," explains Higgins.

But the group didn't stop there. "In our field, if you want to prove an adaptation to the environment, like mountains leading to shorter leg lengths, you can't just look at one species; you have to look at many species in the same situation, and see the same pattern happening over and over again," says Higgins. "We needed to look at other animals with similar leg construction that existed in both flat and mountainous areas, as Neandertals and humans did, to see if animals tended to have shorter lower leg length in the mountains."

The researchers decided to study different types of bovids - a group of mammals including gazelles, antelopes, goats and sheep - since these animals live in warm and cold environments on both flat and hilly terrain. The group took data from the literature on bovid leg bones and found that they fit the pattern: mountainous bovids, such as sheep and mountain goats, overall had shorter lower leg bones than their relatives on flat land, such as antelopes and gazelles, even when they lived in the same climates.

Investigating closely related bovids brought this trend into even sharper relief. Most gazelles live on flat land, and the one mountainous gazelle species examined had relatively shorter lower legs, despite sharing the same climate. Also, among caprids (goats and sheep), which mostly live on mountains, the one flat land member of the group exhibited relatively longer lower legs than all the others.

"Biologists have Bergman's and Allen's Rules, which predict reduced surface area to body size and shorter limbs in colder environments," says Higgins. "Our evidence suggests that we can also predict certain limb configurations based on topography. We believe adding the topic of terrain to ongoing discussions about limb proportions will allows us to better refine our understanding of how living species adapt to their environments. This improved understanding will help us better interpret the characteristics of many fossil species, not just Neandertals."

*Funding for this research was provided by the Johns Hopkins Center of Functional Anatomy and Evolution.*

*This study was completed by Ryan Higgins and Christopher B. Ruff, Ph.D., also of the Johns Hopkins Center of Functional Anatomy and Evolution.*

http://www.eurekalert.org/pub_releases/2011-10/uoc-ttf101911.php

# Tracing the first North American hunters

## *This new study concludes that the first-known hunters in North America can now be dated back at least 14,000 years*

DNA ANALYSIS: A new and astonishing chapter has been added to North American prehistory in regards to the first hunters and their hunt for the now extinct giant mammoth-like creatures – the mastodons. Professor Eske Willerslev's team from the Centre for GeoGenetics, University of Copenhagen, has in collaboration with Michael Waters' team at the Center for the Study of the First Americans, University of Texas A&M, shown that the hunt for large mammals occurred at least 1,000 years before previously assumed.

This new study concludes that the first-known hunters in North America can now be dated back at least 14,000 years. The results are published today in the internationally renowned scientific journal Science.

"I am sure that especially the Native Americans are pleased with the results of the study. It is further proof that humans have been present in North America for longer than previously believed. The "Clovis First" theory, which many scientists swore to just a few years back, has finally been buried with the conclusions of this study," says Professor Eske Willerslev, director of the Centre for GeoGenetics at the Natural History Museum of Denmark, University of Copenhagen.

**Spearhead found in mastodon**

It is the finding and analysis of a tip from a man-made projectile point (spearhead) gathered from the remains of a mastodon that is behind the rewriting of North American prehistory. The spearhead, which itself was carved out from a mastodon-bone, was found at the Manis site in the state of Washington when archaeologists excavated a mastodon in the late 1970s.

However, 30 years would pass before a team of researchers was able to put a date on the spearhead and establish the identity of both the bone and the spearhead that had been embedded into the rib of the defeated mastodon. This was done through, amongst other things, DNA analysis, protein sequencing, advanced computer technology, Carbon-14 dating as well as comparisons with other mastodon findings in North America, for instance in the state of Wisconsin.

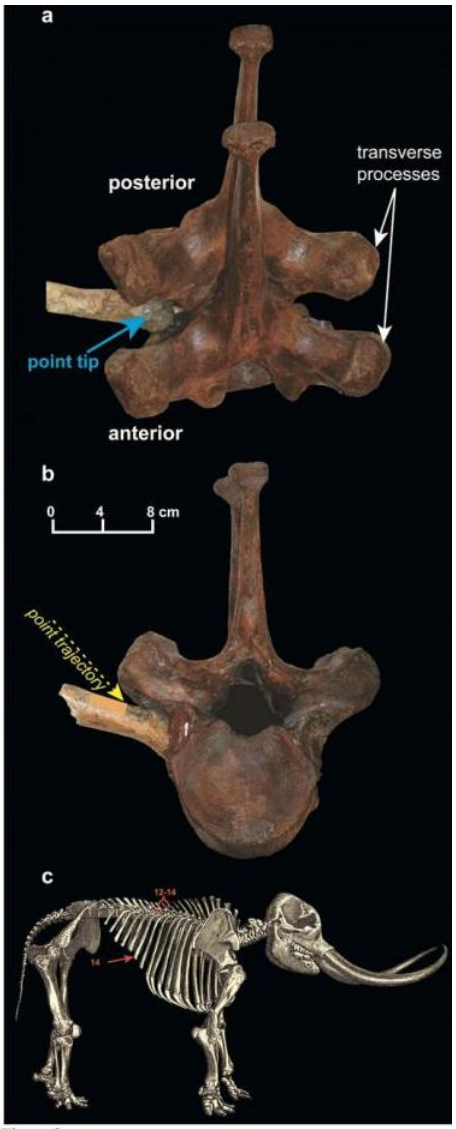



Figure 3.

***This figure shows the anatomical position of the Manis rib. (A) Two vertebrae with the Manis rib inserted into its correct anatomical position. The blue arrow points to the embedded point fragment. (B) Side view of mastodon vertebrae with the Manis rib inserted into its correct anatomical position, with the trajectory of the point indicated. (C) Mastodon skeleton showing the location of ribs 12 to 14.*** **University of Copenhagen**

**Clovis culture challenged**

The first traces of the hunt for mastodons in North America have previously been attributed the so-called Clovis culture. Clovis culture dates back approximately 13,000 years and is viewed as a type of common culture ancestral for all Native American tribes in North America.

"Our research now shows that other hunters were present at least 1,000 years prior to the Clovis culture. Therefore, it was not a sudden war or a quick slaughtering of the mastodons by the Clovis culture, which made the species disappear. We can now conclude that the hunt for the animals stretched out over a much longer period of time. At this time, however, we do not know if it was the man-made hunt for the mastodons, mammoths and other large animals from the so-called mega-fauna, which caused them to become extinct and disappear. Maybe the reason was something complete different, for instance the climate," states Professor Eske Willerslev.

**The Road to America**

It is no more than three years ago that Eske Willerslev and his research team established that the first traces of humans in North America are approximately 14,340 years old, and that the current Native Americans in the

USA are descendants of these migrants who came from Asia. This was done using Carbon-14 dating and DNA analysis of human remains found in caves in the state of Oregon.

Professor Eske Willerslev has been able to add a new chapter to North American prehistory by mapping the now first-known hunters in this part of the world.

*The results are published today in the internationally renowned scientific journal Science.*

***http://www.sciencedaily.com/releases/2011/10/111020025644.htm***

## Alternating Training Improves Motor Learning: Study Suggests Varying Practice Sessions May Benefit People With Motor Disorders

***The findings may help improve therapy for people relearning how to walk following stroke or other injury.***

ScienceDaily - Learning from one's mistakes may be better than practicing to perfection, according to a study in the Oct. 19 issue of The Journal of Neuroscience. The study found that forcing people to switch from a normal walking pattern to an unusual one - and back again - made them better able to adjust to the unusual pattern the following day. The findings may help improve therapy for people relearning how to walk following stroke or other injury.

Previous studies in the lab of Amy Bastian, PhD, of the Kennedy Krieger Institute and Johns Hopkins School of Medicine, found that walking on a split-belt treadmill - which forces one leg to move at a faster speed - can help correct walking deficits in children and adults with weakness on one side of the body caused by stroke, head trauma, or other conditions. In the new study, Bastian and her colleagues found healthy adults forced to alternate between learning and unlearning an unusual walking pattern on a split-belt treadmill relearned the pattern faster the next day.

"The standard approach to helping stroke patients relearn walking and other motor skills is to tell them how to move better, and then practice it over and over again," Bastian said. "The results of our study suggest that the most effective approach might be to repeatedly challenge patients with new training situations."

In the current study, the researchers trained 52 healthy adults to walk on a split-belt treadmill. One group received 15 minutes of constant exposure to belts moving at different speeds, while another - the switch group - walked on belts that alternated between different speeds and identical speeds. Twenty-four hours later, both groups returned to the treadmill to walk on the belts moving at different speeds. The adults in the switch group relearned how to resume the unusual walking pattern faster than those who had constant exposure to different speeds.

"The people in the switch group 'learned to learn' by experiencing more of the awkward, limping leg pattern that occurs right after a switch in speeds," Bastian said.

Contrary to the researchers' predictions, they also found practicing a completely different walking pattern did not interfere with the ability to relearn the first one. A third group practiced walking on a split-belt treadmill that forced the right leg to move faster for 15 minutes, followed by 15 minutes in which the left leg moved faster. When they returned the next day, they too relearned the initial walking pattern slightly faster than those who trained only on a single pattern.

"This 'learning to learn' effect has exciting potential for the design of therapeutic interventions for patients whose motor skills have been compromised by stroke or injury," said Rachael Seidler, PhD, a motor learning expert at the University of Michigan, who was unaffiliated with the study. "It is particularly intriguing that these effects are specific to the early, more cognitively demanding stages of learning," Seidler added.

*The research was supported by the Eunice Kennedy Shriver National Institute of Child Health & Human Development.*

***http://www.sciencedaily.com/releases/2011/10/111020025754.htm***

## More Evidence That Allergies May Help in Fighting Brain Tumors

***Some new but qualified support for the idea that the immune system's response to allergies may reduce the risk of developing deadly brain tumors***

ScienceDaily - A study published online Oct. 18 in the Journal of the National Cancer Institute provides some new but qualified support for the idea that the immune system's response to allergies may reduce the risk of developing deadly brain tumors.

"These results suggest that there is something different about the immune response to tumor cells in people with allergies."People with somewhat elevated blood levels of immunoglobulin E (IgE), antibodies that carry out the body's immune response to allergens, were significantly less likely to develop gliomas, and those who did survived somewhat longer, than those with clinically normal IgE levels, according to the study by a team of researchers at Brown University and several other institutions in the United States and Europe.

"These results suggest that there is something different about the immune response to tumor cells in people with allergies," said corresponding author Dominique Michaud, associate professor of epidemiology in the Public Health Program at Brown University. "In terms of fighting the cancer or preventing it from growing, people who have allergies might be protected. They might be able to better to fight the cancer."

**Questions answered, questions raised**

The new study employed a methodology that addresses questions raised by previous studies that have also reported similar associations between IgE, or allergy symptoms, and brain tumors. Instead of asking people who have or have not been diagnosed with brain tumors to describe their allergy history or to take IgE tests, the study delved into the detailed records of tens of thousands of people who participated in four broad-based health studies: the Physicians' Health Study, the Nurses' Health Study, the Women's Health Study, and the Health Professionals Follow-up Study.

Such "prospective" analysis of samples collected from patients before they were diagnosed or treated for brain tumors, allowed the researchers to measure the association between IgE and brain cancer risk without worry that the IgE levels were affected by the course of the disease and treatments for it.

"This is really the first study to look at total IgE levels collected prior to disease," Michaud said. "This is important in being able to determine whether this is a causal effect."

Although the pool of patients in the four studies was large, the actual number of relevant cases was small. Only 169 people with stored plasma subsequently developed brain tumors. They were matched with 520 control subjects (otherwise similar people who did not develop tumors). The small numbers blunted some of the study's results.

For example, the researchers found a statistically significant reduction in glioma risk among people with borderline elevated IgE levels (in a range of 25,000 to 100,000 units per liter), but not for people with even higher levels of IgE. Michaud acknowledged that further research would be needed to explain why the protective effect couldn't be measured in people with the highest IgE levels.

Ultimately, Michaud said, by strengthening the evidence that allergic immune response may affect brain tumors, the study may encourage cancer researchers to focus on the biological mechanisms underlying this association and provide insight into the disease and its treatment.

In addition to Brown, other institutions with affiliated authors of the paper include Imperial College in London, Brigham and Women's Hospital in Boston, and the Harvard University School of Public Health in Boston. *The National Institutes of Health funded the study.*

***http://www.physorg.com/news/2011-10-long-held-belief-debunked-cycad-dinosaur.html***

## Long-held belief debunked: Cycad is not a 'Dinosaur Plant'

***The widely held belief today's cycads are 'dinosaur plants' and were around during dinosaur times has been categorically debunked in a breakthrough study of international significance.***

***Cycadophyta.*** **Wikipedia**

PhysOrg.com - Leader of the study, Dr Nathalie Nagalingum, Research Scientist at Sydney's Royal Botanic Garden said a molecular clock has revealed today's species are totally different from those growing in the Jurassic period which began 200 million years ago.

"We then looked at the extinction of dinosaurs 65.5 million years ago and found there was a gap of 55 million years between when dinosaurs were extinct and modern cycads started to diversify," Dr Nagalingum said. "We can now say that living cycad species are not ancient or leftovers from dinosaur times. They evolved independently of dinosaurs only 10 million years ago. The recent radiation of cycads radically changes our view of these emblematic living fossils."

Dr Nagalingum explained the finding was a result of her research at Harvard University and the University of California, Berkeley using a combination of fossils and DNA sequences.

"We studied all 11 groups of cycads and two-thirds of the 300 species. The outcome showed that all cycads - regardless of where they were growing in the world - only began diversifying 10 million years ago," she said.

"It was amazing that all the cycad groups across the globe (in Australia, Africa, south-east Asia, and Central America) began to diversify at the same time. This indicated that a trigger may have been responsible. It seems that the trigger was a change in the climate, that is when global cooling began and when the world started having distinct seasons."

Dr Nagalingum said that, although cycads evolved recently, they are under threat from extinction.

"Today, cycads are listed as the most endangered plants and most likely victims of a mass extinction being caused by humans," she said. "Cycads are very slow-growing plants so it's hard to predict whether cycads can survive, now that climate change is occurring at a much faster rate," Dr Nagalingum said.

*The paper "Recent synchronous radiation of a living fossil" is available online in the journal Science Express.*
*Provided by Royal Botanic Garden, Sydney*

***http://www.sciencedaily.com/releases/2011/10/111021084539.htm***

## Plate Tectonics May Control Reversals in Earth's Magnetic Field

### *Over the last 300 million years, reversal frequency has depended on the distribution of tectonic plates on the surface of the globe*

ScienceDaily - Earth's magnetic field has reversed many times at an irregular rate throughout its history. Long periods without reversal have been interspersed with eras of frequent reversals. What is the reason for these reversals and their irregularity? Researchers from CNRS and the Institut de Physique du Globe(*) have shed new light on the issue by demonstrating that, over the last 300 million years, reversal frequency has depended on the distribution of tectonic plates on the surface of the globe. This result does not imply that terrestrial plates themselves trigger the switch over of the magnetic field. Instead, it establishes that although the reversal phenomenon takes place, in fine, within Earth's liquid core, it is nevertheless sensitive to what happens outside the core and more specifically in Earth's mantle.

This work is published on 16 October 2011 in Geophysical Research Letters.

Earth's magnetic field is produced by the flow of liquid iron within its core, three thousand kilometers below our feet. What made researchers think of a link between plate tectonics and the magnetic field? The discovery that convective liquid iron flows play a role in magnetic reversals: experiments and modeling work carried out over the last five years have in fact shown that a reversal occurs when the movements of molten metal are no longer symmetric with respect to the equatorial plane. This "symmetry breaking" could take place progressively, starting in an area located at the core-mantle boundary (the mantle separates Earth's liquid core from its crust), before spreading to the whole core (made of molten iron).

Extending this research, the authors of the article asked themselves whether some trace of initial symmetry breakings behind the geomagnetic reversals that have marked Earth's history, could be found in the only records of large-scale geological shifts in our possession, in other words the movements of continents (or plate tectonics). Some 200 million years ago, Pangaea, the name given to the supercontinent that encompassed almost all of Earth's land masses, began to break up into a multitude of smaller pieces that have shaped Earth as we know it today. By assessing the surface area of continents situated in the Northern hemisphere and those in the Southern hemisphere, the researchers were able to calculate a degree of asymmetry (with respect to the equator) in the distribution of the continents during that period.

In conclusion, the degree of asymmetry has varied at the same rhythm as the magnetic reversal rate (number of reversals per million years). The two curves have evolved in parallel to such an extent that they can almost be superimposed. In other words, the further the centre of gravity of the continents moved away from the equator, the faster the rate of reversals (up to eight per million years for a maximum degree of asymmetry).

What does this suggest about the mechanism behind geomagnetic reversals? The scientists envisage two scenarios. In the first, terrestrial plates could be directly responsible for variations in the frequency of reversals: after plunging into Earth's crust at subduction zones, the plates could descend until they reach the core, where they could modify the flow of iron. In the second, the movements of the plates may only reflect the mixing of the material taking place in the mantle and particularly at its base. In both cases, the movements of rocks outside the core would cause flow asymmetry in the liquid core and determine reversal frequency.

** -- Laboratoire de Physique Statistique of ENS (Ecole Normale Supérieure/CNRS/UPMC/Université Paris Diderot) and the Institut de Physique du Globe de Paris (CNRS/IPGP/Université Paris Diderot)*

***http://www.sciencenews.org/view/generic/id/335484/title/Measles_cases_up_in_U.S._and_Canada***

## Measles cases up in U.S. and Canada

### *Both countries report highest numbers in 15 years*

**By Nathan Seppa**

BOSTON - Measles, a preventable disease that has been largely vanquished in the United States, continues to show up sporadically in the population as unvaccinated people traveling to other countries unwittingly bring back infections, researchers report. Data released at a meeting of the Infectious Diseases Society of America show that 2011 has been a bad year for this kind of spread, with the highest number of U.S. measles cases since 1996. Other data from the meeting indicate that many U.S. pediatricians are doing their best to keep these cases away from their patients, turning away families that refuse to have their children vaccinated - whether against

measles or other diseases. There have been 214 measles cases in the United States so far this year, says epidemiologist Huong McLean of the Centers for Disease Control and Prevention in Atlanta. Of these patients, 68 were hospitalized and 12 developed pneumonia. Roughly 86 percent of people who contracted measles were either unvaccinated or had unknown vaccination status, the CDC data show.

The measles influx has been highly sporadic, with 73 different people bringing in an infection, McLean says. Most were U.S. residents visiting Europe. "They're having a big year in Europe, and we're feeling the effects here," she says, noting that Europe has reported 28,000 cases of measles in 2011 so far, many in France.

In Canada, Quebec province has had 759 cases, says Gaston De Serres, a physician and epidemiologist at Laval University in Quebec City. The 2011 toll in Canada as a whole is now 783, the highest since 1995.

The spotty measles outbreaks are a far cry from the pre-vaccination days in the 1960s, when the United States could expect hundreds of thousands of infections and thousands of people hospitalized. But they are notable compared to the past decade, which has typically seen no more than a few dozen measles cases annually in the United States.

When a measles outbreak is reported, standard public health measures are mobilized to limit the spread. For example, in Utah this spring, 184 people were quarantined when an unvaccinated student returned home from Europe with measles and nine people became ill, according to epidemiologist Karyn Leniek of the Utah Department of Health in Salt Lake City.

At the clinical practice level, some doctors are taking a preemptive approach. Physicians Chris Harrison and Tom Tryon of the University of Missouri in Kansas City presented data from a survey of more than 900 pediatricians in nine states showing that 21 percent stopped accepting appointments from families that refused to have their children vaccinated. In Minnesota that rate was only 1 percent, but in Iowa it was closer to 30 percent, Tryon says.

"This has become an increasingly controversial issue," Harrison says. Doctors typically give such families a 30-day warning to find another practice, he says. Tryon says he simply doesn't accept vaccine-refusing families in his practice, citing "concerns about the effect that preventable diseases might have in my waiting room."

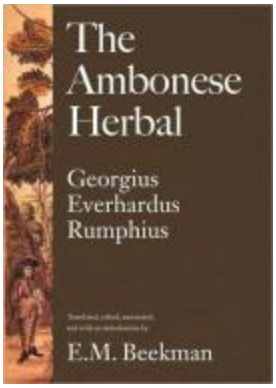
"There a misperception regarding vaccines," says Saad Omer, an epidemiologist at Emory University in Atlanta who has studied the vaccine refusal issue. Many younger parents, he says, "are coming of age in an era where they don't see these diseases. But they hear of real or perceived adverse events from vaccinations."

Resolving doubts about vaccination will require physicians to communicate with and counsel their patients, he says. "This issue is not going to go away on its own."

***http://bit.ly/qhJz26***

## BOOK REVIEW: The Ambonese Herbal, Volume 1: Introduction and Book I: *Containing All Sorts of Trees, That Bear Edible Fruits, and Are Husbanded*

**Review by Susan Milius**




Anyone who has slogged through some prolonged, hope-sucking endeavor to get published may wish to toast the first full English translation of this storied herbal. The six-volume botanical masterpiece from the 17th century still has things to say to modern readers, as well as to long-suffering writers. In fact, the book inspired a 2005 pharmacology paper reporting nine novel compounds for further drug research.

The herbal's writer, German-born Georg Eberhard Rumf (Latinized as Rumphius) shipped off to the Spice Islands in what is now Indonesia in 1652 to work for the Dutch East Indies Company on its spice route. (For a taste of spice politics, see translator Beekman's detailed introduction in Volume One and lively footnotes throughout.)

Rumf took up documenting natural history on the island of Ambon. His herbal includes descriptions, medical uses and cultural lore on plants from pomegranates to the tree of blind eyes. He persevered despite going blind himself in his early 40s, losing his wife and a daughter in an earthquake and tsunami, and then losing all his drawings when his house caught fire. He had the drawings redone and five years after the fire sent half the manuscript to Europe. The ship carrying it sank.

In 1697, after 37 years of work, Beekman estimates, the manuscript reached company headquarters. The company, concerned about trade secrets, forbade publication. The volumes were eventually published, in Dutch, beginning in 1741.

Beekman, a Dutch scholar, died before his translation was published. He deserves a toast, as does the remarkable Rumf and - why not - all who have struggled to reach the end of that faraway last sentence.

*Yale Univ. Press and National Tropical Botanical Garden, 2011, Vol. I: 548 p., $85; Six-volume set: 3,360 p., $450*

http://www.sciencedaily.com/releases/2011/10/111021162251.htm

## Commonly Used Three-Drug Regimen for Idiopathic Pulmonary Fibrosis Found Harmful

***The National Heart, Lung, and Blood Institute (NHLBI), part of the National Institutes of Health, has stopped one arm of a three arm multi-center, clinical trial studying treatments for the lung-scarring disease idiopathic pulmonary fibrosis (IPF) for safety concerns.***

ScienceDaily -The trial found that people with IPF receiving a currently used triple-drug therapy consisting of prednisone, azathioprine, and N-acetylcysteine (NAC) had worse outcomes than those who received placebos or inactive substances. "These findings underscore why treatments must be evaluated in a rigorous manner," said Susan B. Shurin, M.D., acting director of the NHLBI. "This combination therapy is widely used in patients with IPF, but has not previously been studied in direct comparison to a placebo for all three drugs."

The interim results from this study showed that compared to placebo, those assigned to triple therapy had greater mortality (11 percent versus 1 percent), more hospitalizations (29 percent versus 8 percent), and more serious adverse events (31 percent versus 9 percent) and also had no difference in lung function test changes. Participants randomly assigned to the triple- therapy arm also remained on their assigned treatment at a much lower rate (78 percent adherence versus 98 percent adherence).

"Anyone on some combination of these medications with questions or concerns should consult with their health care provider and not simply stop taking the drugs," said Ganesh Raghu, M.D., professor of medicine at the University of Washington, Seattle and a co-chair of this IPF study. "It is important to realize that these results definitively apply only to patients with well-defined IPF and not to people taking a combination of these drugs for other lung diseases or conditions."

The other two study arms, or intervention groups, of this IPF trial comparing NAC alone to placebo alone will continue. In stopping this part of the trial, the NHLBI accepted the recommendation of the Data and Safety Monitoring Board (DSMB) -- an independent advisory group of experts in lung disease, biostatistics, medical ethics, and clinical trial design. The DSMB has been monitoring the study since it began.

This study, called PANTHER-IPF (Prednisone, Azathioprine, and N-acetylcysteine: A Study that Evaluates Response in Idiopathic Pulmonary Fibrosis) was designed and conducted by the Idiopathic Pulmonary Fibrosis Clinical Research Network, funded by the NHLBI. The PANTHER-IPF study was designed to evaluate whether this commonly used triple-therapy regimen could slow disease progression and improve lung function in people with moderate IPF. PANTHER-IPF was the first study in IPF comparing the effectiveness of this combined treatment to a placebo for all three drugs. Each participant had a one in three chance of being randomized to receive the triple drug regimen, NAC alone, or placebo for a period of up to 60 weeks.

"We will continue to analyze the data to try to understand why this particular combination may be detrimental in people with IPF," said Fernando Martinez, M.D., professor of medicine, University of Michigan, Ann Arbor and co-chair of the PANTHER-IPF study. "The results are not explained by any differences between the two groups before the treatments started."

IPF is a progressive and currently incurable disease characterized by the buildup of fibrous scar tissue within the lungs. This accumulation of scar tissue leads to breathing difficulties, coughing, chest pain, and fatigue. Approximately 200,000 people in the United States have IPF. The cause or causes of IPF remain unknown; as a result treatment options remain limited. PANTHER-IPF began enrollment in October 2009.

The study had enrolled 238 of a planned 390 participants prior to the stop announcement. Participants ranged from 48 to 85 years of age, with an average age of 68. The placebo and NAC arms will continue enrolling and following their participants, and this part of the PANTHER-IPF study is expected to be completed by late 2013.

*In addition to NIH funding, the Cowlin Family Fund at Chicago Community Trust provided financial support for this study. Zambon donated the NAC and matching placebo; the prednisone, azathioprine, and their matching placebos were purchased using study funds. Find more information about this clinical trial at http://clinicaltrials.gov/ct2/show/NCT00650091*

http://www.bbc.co.uk/news/health-15401739

## Lung cancer vaccine shows promise

***A vaccine which triggers the immune system to attack the most common type of lung cancer has shown promise in early clinical trials, say researchers.***

Tests on 148 patients, reported in the Lancet Oncology, showed that adding the vaccine to chemotherapy slowed the cancer's progression. However, its effect on overall survival was limited and further trials are now needed. Cancer Research UK said there were many unanswered questions.

Vaccines for cancer use the same principles as vaccines against infection - training the body's own immune system. However, instead of protecting against measles or seasonal flu, these vaccines attack tumours growing in the body.

The idea is that when a cell becomes cancerous and divides uncontrollably, its starts to look different. Proteins on the surface of the cells change and the immune system can be trained to spot these changes.

**Targeted**

Researchers at the University of Strasbourg used a vaccine called TG4010. It is a modified pox virus, distantly related to smallpox, which has been genetically modified to make a "cancerous" surface protein.

Patients with advanced non-small-cell lung cancer took part in the trial. All were given standard chemotherapy treatment, half were also infected with the virus. Six months later, the illness was more likely to be stable in vaccinated patients than in those just taking chemotherapy drugs. Six month "progression free survival" was 43% for vaccinated patients and 35% for those on chemotherapy. However average survival was 10.7 months in vaccinated patients, only marginally higher than the 10.3 months in chemotherapy patients.

Prof Peter Johnson, chief clinician at Cancer Research UK, said: "There's a lot of interest in harnessing the power of the immune system to treat cancer. This early-stage study shows that combining a vaccine with chemotherapy is possible, and may have some benefits for some people with lung cancer.

"But this study leaves a lot of unanswered questions - further research is needed to see whether the vaccine will actually improve survival for lung cancer patients."

***http://www.eurekalert.org/pub_releases/2011-10/iof-boo102111.php***

## Burden of osteoporotic fractures increases dramatically in the Middle East and Africa

### *New report shows enormous human, social and economic cost of fractures in the region*

A new audit report issued today by the International Osteoporosis Foundation (IOF) shows that osteoporosis is a serious and growing problem throughout the Middle East and parts of Africa.

Gathering data from 17 countries in the region as well as Turkey, 'The Middle East & Africa Regional Audit' is a landmark report examining epidemiology, costs and burden in individual countries as well as collectively across the region. The report was launched at the close of the 1st Middle East and Africa Osteoporosis Meeting, with a statement by Abdullah bin Sougat, Secretary of State for the office of His Highness Sheikh Hamdan Bin Rashid Al Maktoum, Deputy Ruler of Dubai.

A major increase in fractures is predicted for the region as a whole. In the Middle East, a predicted demographic explosion in the number of people over the age of 50 will take place in the coming decades. By 2020 it is expected that 25% of the population will be over the age of 50 and by 2050 this will rise to 40%. In Lebanon, Jordan, and Syria, this means that the number of hip fractures is projected to quadruple by 2050.

An alarming finding from the report shows that solid epidemiological research on osteoporosis and fracture incidence, and related relevant outcomes, is scarce at best. The Lead Author of the report, Professor Ghada El-Hajj Fuleihan, Director of the Calcium Metabolism and Osteoporosis Program, and WHO Collaborating Center for Metabolic Bone Disorders, at the American University of Beirut, commented, "This report reveals that a great research gap needs to be filled. Published data on incidence rates for hip fractures are only available for Iran, Kuwait, Saudi Arabia, Lebanon, Morocco and Turkey. Furthermore, access to densitometry and care was limited in many countries, and reimbursement for diagnostics and therapeutics varied widely". One of the primary recommendations of this report is the need for more research to gather the necessary evidence that would aid health authorities to develop comprehensive healthcare policies at all levels.

Due to economic development, non-communicable diseases have become the leading cause of mortality and morbidity in the region, yet osteoporosis has been identified as a national health priority in only three countries in this report and national osteoporosis treatment guidelines are available in only five countries.

As well DXA technology, considered the gold standard for measurement of bone mineral density, is not widely available or available only in urban centres in many cases. Furthermore, the level of awareness of osteoporosis among primary healthcare professionals is estimated as poor to medium in many countries. Education and lifestyle prevention programmes for the general public, measures which could help stem the rising tide of fractures in the coming decades, are also seriously lacking.

**W**idespread vitamin D deficiency and low calcium intake may be in part responsible for the alarming increase in osteoporosis. The prevalence of hypovitaminosis D is one of the highest in the world, and has been estimated to range between 50-90% in many countries and across all age groups, despite ample sunshine in the region.

Dr. med Gemma Adib, first author of the report and General Secretary of the Pan Arab Osteoporosis Society, stated "Vitamin D is an essential component of bone health and a relatively inexpensive way to decrease fracture risk. It is essential that the region develops vitamin D supplementation strategies based on local data for at-risk groups."

For the individual, fragility fractures result in great suffering, disability as well as loss of productivity and quality of life. Fractures also represent an enormous burden for healthcare systems. Older people who suffer hip

fractures are often faced with long-term disability that results in loss of independence and higher risk of death. Mortality rates after hip fracture may be higher in the Middle East and Africa than those reported from Western populations. While such rates vary between 25-35% in Western populations, preliminary studies have shown that these rates may be as high as 2-2.5 fold higher in certain populations within this region.

IOF President Professor John A. Kanis spoke at the launch of the Audit and commented, "Despite the severity of the problem, osteoporosis is being dangerously ignored as it competes with other diseases for scarce healthcare resources and recognition. Notwithstanding the burden of fragility fractures, osteoporosis remains greatly under diagnosed and under treated, and both health professional training and public awareness is sub optimal in most countries in the region. The result is premature death for many hip fracture sufferers, immense personal suffering, lost productivity and long-term dependence on family members."

The International Osteoporosis Foundation joins local osteoporosis societies throughout the region to urge immediate government action to help prevent the rising tide of fractures and their profound socio-economic impact on millions of people and communities throughout the Middle-East and Africa.

*The publication of The Middle East and Africa Regional Audit was supported by an unrestricted grant from Servier and Fonterra. The Middle East and Africa Regional Audit is published by the International Osteoporosis Foundation (IOF) . The report can be downloaded free of charge from the IOF website at www.iofbonehealth.org*

**http://www.wired.com/wiredscience/2011/10/polio-not-soon/**

## Scathing Report: Polio Eradication "Not... Any Time Soon"

***An independent monitoring board convened by the worldwide polio-eradication initiative has delivered a report on the global effort that is striking for its brutally frank and even frustrated tone.***

**By Maryn McKenna Email Author**

Among its findings, just in its first few pages: "Case numbers are rising"; "unwelcome surprises continue"; "as many milestones are being missed as are being met"; and "the (eradication) Programme is not on track for its end-2012 goal, or for any time soon after unless fundamental problems are tackled."

Possibly the biggest problem, the board concludes, is a get-it-done optimism so ingrained in the 23-year effort that it cannot acknowledge when things are not working:

*** We have observed that the Programme:**

**** Is not wholly open to critical voices, perceiving them as too negative – despite the fact that they may be reporting important information from which the Programme could benefit.***

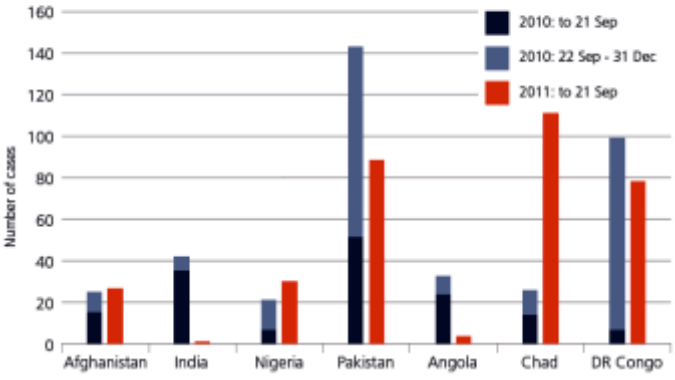
***Tends to believe that observed dysfunctions are confined to the particular geography in which they occur, rather than being indicative of broader systemic problems.***

**** Displays nervousness in openly discussing difficult or negative items.***

If some of this sounds familiar, that is because the board hit similar notes in its last report in July, in which it declared that the international effort "is not on track to interrupt polio transmission as it planned to do by the end of 2012." I get the sense, reading the latest, that the board does not believe it was heard.

As before, the board - which comprises eight very senior public-health experts, including a former director of the US Centers for Disease Control and Prevention - assesses what is going on in countries where the disease either has never been beaten, or has surged back across borders and become re-established. This time, though, they have added an assessment of problems across the entire campaign that could keep the effort - to make polio the second human disease eradicated after smallpox - from succeeding.

**Figure 1: Every country except Angola and India has had more cases in 2011 than it had by this time last year. Chad, Afghanistan and Nigeria have already exceeded their entire 2010 total.**




They review problems in three of the four endemic countries (Nigeria, Afghanistan and Pakistan) and praise progress in the last, India, which strikingly has had no polio cases for almost a year. Then they turn to the countries where polio has been re-imported, including three especially problematic ones - Angola, Chad and the Democratic Republic of the Congo - where the disease was once fought to a halt, but then was reimported, and now has become so entrenched that it is as if transmission there had never been stopped.

Of the seven countries, they point out, five have had more cases so far this year than in all of 2010.

**Out of the five, the board reserves its greatest worry for Pakistan, about which it says:**
***"Pakistan's progress now lags far behind every other country in the world. Without urgent and fundamental change, it is a safe bet that it will be the last country on earth to host polio."***

Beyond the country worries, though, the assessment identifies problems that extend throughout the worldwide effort. The board is strikingly candid in asking pointed questions about them.

**** How can it be that individuals known to be tired and ineffective are allowed to remain in key leadership positions?***
**** How can it be that front-line positions in some countries remain so underrewarded that they are not attractive to the kind of workforce that the GPEI needs?***
**** How can it be that some people are not held accountable for poor performance?***
**** How can it be that some vaccinators are not paid the money that they are promised?***
**** How can it be that some team leaders are not capable of quality assuring the work they are supervising?***

Questions such as this could be dismissed as the sort of internal challenging that can arise in any vast bureaucracy, but the monitoring board are not the only group that are asking these questions. In July, the Financial Times ran a tough editorial (now behind a paywall) in which it told the global effort to "radically step up their commitment or have the courage to abandon the goal." Last week, the Economist examined the failure of polio campaigns in Pakistan, the country responsible for re-seeding polio to China, and summed up the situation as: "Pakistan flounders."

The eradication effort is a joint project of the World Health Organization, UNICEF, the Gates Foundation, and Rotary International, whose millions of businessperson members are the campaign's relentless ground troops. (Despite the report's bluntness, Dr. Robert Scott, chairman of Rotary's contribution to the effort, wrote me Friday that "The success we've experienced over the past two decades - more than a 99 percent reduction in polio - is grounds for reasoned optimism, and we have never experienced any significant membership fatigue regarding polio eradication… The reasoned optimism of Rotarians is very different than pie-in-the-sky, Pollyanna-type optimism, which is why we take the message of the IMB report very seriously.") The effort's first deadline for interrupting transmission everywhere in the world was 2000, which was then postponed to 2002, 2005 and now the end of 2012.

The monitoring board is clearly skeptical that deadline will be met. It ends its analysis by saying:
**** Fifteen months remain. We continue to genuinely believe that this is long enough - that success could still be attained. But this will not happen through more of the same, nor will it happen by sharpening performance here and there. It will only happen if the Programme seizes on the most fundamental problems that this report identifies and deals with them as real organizational, national and global priorities. Some of the problems identified in this report run so deep that nobody should believe that 'more time' is the solution to them. The focus needs to be on solving the problems themselves. More time may be a requirement, but is not the answer in itself.***

It concludes by underlining why the effort remains worthwhile:
***"To fail now would unleash widespread suffering and death on the world's most vulnerable children."***

***http://www.physorg.com/news/2011-10-gps-alzheimer-patients.html***

## GPS shoes for Alzheimer's patients to hit US

### *The shoes will sell at around $300 a pair*

The first shoes with built-in GPS devices -- to help track down dementia-suffering seniors who wander off and get lost -- are set to hit the US market this month, the manufacturer says. GTX Corp said the first batch of 3,000 pairs of shoes has been shipped to the footwear firm Aetrex Worldwide, two years after plans were announced to develop the product. The shoes will sell at around $300 a pair and buyers will be able to set up a monitoring service to locate "wandering" seniors suffering from Alzheimer's Disease.

Andrew Carle, a professor at George Mason University's College of Health and Human Services who was an adviser on the project, said the shoes are likely to save lives and avoid embarrassing and costly incidents with the elderly. "It's especially important for people in the earliest stages of Alzheimer's who are at the highest risk," Carle told AFP.

"They might be living in their home but they're confused. They go for a walk and they can get lost for days."

Carle said studies indicate more than five million Americans suffer from Alzheimer's, a number expected to quadruple in the coming years. He said 60 percent of sufferers will wander and become lost and up to half of those lost who are not found within 24 hours may die, from dehydration, exposure or injury.

Other devices such as bracelets or pendants can provide similar protection but seniors often reject these.

"The primary reason is that paranoia is a manifestation of the disease," Carle said. "If you put something on someone with Alzeheimer's that they don't recognize, they remove it. If it's a wristwatch and it's not their wristwatch, they will take it off. So you have to hide it."

The GPS system, which is implanted in the heel of what appears to be a normal walking shoe, allows family members or carers to monitor the wearer and to set up a "geofence" that would trigger an alert if the person strays beyond a certain area. The shoes are being developed by GTX Corp., which makes miniaturized Global Positioning Satellite tracking and location-transmitting technology, and Aetrex. They received certification from the Federal Communications Commission this year for the system. The makers say the market for such shoes is growing, given the soaring costs of Alzheimer's.

"This is a significant milestone for both companies and while the $604 billion worldwide cost of dementia has become and will continue to be a significant fiscal challenge, the under $300 GPS enabled shoes will ease the enormous physical and emotional burden borne by Alzheimer's victims, caregivers and their geographically distant family members," said Patrick Bertagna, chief executive of GTX Corp.

Professor Carle said the original idea was to develop the shoes for children and long-distance runners but the makers changed the plan when he offered his advice, noting that the devices can also help ease a lot of anxiety about seniors who want to remain active. "They feel a need to walk and it is good for them," he said. "They should take a walk. It's good for them." *(c) 2011 AFP*

***http://medicalxpress.com/news/2011-10-bioengineered-protein-preliminary-therapy-hemophilia.html***

## Bioengineered protein shows preliminary promise as new therapy for hemophilia

***A genetically engineered clotting factor that controlled hemophilia in an animal study offers a novel potential treatment for human hemophilia and a broad range of other bleeding problems.***

The researchers took the naturally occurring coagulation factor Xa (FXa), a protein active in blood clotting, and engineered it into a novel variant that safely controlled bleeding in mouse models of hemophilia. "Our designed variant alters the shape of FXa to make it safer and efficacious compared to the wild-type factor, but much longer-lasting in blood circulation," said study leader Rodney A. Camire, Ph.D., a hematology researcher at The Children's Hospital of Philadelphia. The study appears online today in Nature Biotechnology, and will be published in the journal's November 2011 print issue.

"The shape of the variant FXa changes when it interacts with another clotting factor made available following an injury," added Camire. "This increases the functioning of the protein which helps stop bleeding." Camire is an associate professor of Pediatrics in the Perelman School of Medicine at the University of Pennsylvania.

In hemophilia, an inherited single-gene mutation impairs a patient's ability to produce a blood-clotting protein, leading to spontaneous, sometimes life-threatening bleeding episodes. The two major forms of the disease, which occurs almost solely in males, are hemophilia A and hemophilia B, characterized by which specific clotting factor is deficient. Patients are treated with frequent infusions of clotting proteins, which are expensive and sometimes stimulate the body to produce antibodies that negate the benefits of treatment.

Roughly 20 to 30 percent of patients with hemophilia A and 5 percent of hemophilia B patients develop these inhibiting antibodies. For those patients, the conventional treatment, called "bypass therapy," is to use drugs such as factor VIIA and activated prothrombin complex concentrates (aPCCs) to restore blood clotting capability. But these agents are costly (as much as $30,000 per treatment) and not always effective. Camire added that, in the current animal study, they were able to show the variant protein is more effective at a lower dose than FVIIa.

The range of options for hemophilia patients could improve if the study results in animals were to be duplicated in humans. "The variant we have developed puts FXa back on the table as a possible therapeutic agent," said Camire. Naturally occurring (wild-type) FXa, due to its particular shape, is not useful as a therapy because normal biological processes shut down its functioning very quickly.

By custom-designing a different shape for the FXa protein, Camire's study team gives it a longer period of activity, while limiting its ability to engage in unwanted biochemical reactions, such as triggering excessive clotting. "This potentially could lead to a new class of bypass therapy for hemophilia, but acting further downstream in the clot-forming pathway than existing treatments," said Camire, who has investigated the biochemistry of blood-clotting proteins for more than a decade.

When infused into mice with hemophilia, the FXa variant reduced blood loss after injury, as it safely restored blood clotting ability. Further studies are necessary in large animal models to determine whether this approach can become a clinical treatment for hemophilia patients who have developed inhibitors, or even more broadly as a drug for uncontrolled bleeding in other clinical situations.

*More information: "A zymogen-like factor Xa variant corrects the coagulation defect in hemophilia," Nature Biotechnology, published online Oct. 23, 2011, to appear in Nov. 2011 print edition. doi: 10.1038/nbt.1995*
*Provided by Children's Hospital of Philadelphia*

***http://www.physorg.com/news/2011-10-mysterious-life-extreme-deep-sea.html***

## Researchers identify mysterious life forms in the extreme deep sea (w/ video)

***A summer research expedition organized by scientists at Scripps Institution of Oceanography at UC San Diego has led to the identification of gigantic amoebas at one of the deepest locations on Earth.***

PhysOrg.com - During a July 2011 voyage to the Pacific Ocean's Mariana Trench, the deepest region on the planet, Scripps researchers and National Geographic engineers deployed untethered free-falling/ascending landers equipped with digital video and lights to search the largely unexplored region. The team documented the deepest known existence of xenophyophores, single-celled animals exclusively found in deep-sea environments. Xenophyophores are noteworthy for their size, with individual cells often exceeding 10 centimeters (4 inches), their extreme abundance on the seafloor and their role as hosts for a variety of organisms.

***Close-ups of xenophyophores obtained on previous expeditions. Photo credit: Lisa Levin*** **all except upper right, credit David Checkley**

The researchers spotted the life forms at depths up to 10,641 meters (6.6 miles) within the Sirena Deep of the Mariana Trench. The previous depth record for xenophyophores was approximately 7,500 meters (4.7 miles) in the New Hebrides Trench, although sightings in the deepest portion of the Mariana Trench have been reported. Scientists say xenophyophores are the largest individual cells in existence. Recent studies indicate that by trapping particles from the water, xenophyophores can concentrate high levels of lead, uranium and mercury and are thus likely highly resistant to large doses of heavy metals. They also are well suited to a life of darkness, low temperature and high pressure in the deep sea.

"The research of Scripps Professor Lisa Levin (deep-sea biologist) has demonstrated that these organisms play host to diverse multicellular organisms," said Doug Bartlett, the Scripps marine microbiologist who organized the Mariana Trench expedition. "Thus the identification of these gigantic cells in one of the deepest marine environments on the planet opens up a whole new habitat for further study of biodiversity, biotechnological potential and extreme environment adaptation."

The xenophyophores are just the tip of the iceberg when it comes to considerations of the nature and diversity of life at extreme depths. For example, according to Dhugal Lindsay (Japan Agency for Marine-Earth Science and Technology, or JAMSTEC), the Dropcam movie also depicts the deepest jellyfish observed to date.

The instruments used to spot the mysterious animals were "Dropcams" developed and used by National Geographic Society Remote Imaging engineers Eric Berkenpas and Graham Wilhelm, participants in the July voyage.

"The 'Dropcams' are versatile autonomous underwater cameras containing an HD camera and lighting inside of a glass bubble," said Berkenpas. "They were created by National Geographic engineers to allow scientists and filmmakers to capture high-quality footage from any depth in the ocean. The devices were baited and used 'camera-traps' to capture imagery of approaching marine life."

Scripps ocean engineer Kevin Hardy (right) and marine technician Josh Manger prepare to test Hardy's deep-sea lander at Scripps' Nimitz Marine Facility. Dropcams utilize a thick-wall glass sphere capable of withstanding more than eight tons per-square-inch pressure at extreme depth.

"Seafloor animals are lured to the camera with bait, a technique first developed by Scripps Professor John Isaacs in the 1960s," said Kevin Hardy, a Scripps ocean engineer and cruise participant. Hardy advanced the ultra-deep glass sphere design used on 'Dropcams' more than a decade ago. "Scripps researchers hope to one day capture and return novel living animals to the laboratory for study in high pressure aquariums that replicate the trench environment."

Also during the expedition, Scripps researchers successfully tested an advanced seafloor Deep Ocean Vehicle (DOV) design, using similar spheres to recover microbes and test other advanced system components.

The xenophyophore sightings were positively identified by Scripps' Levin, director of the Scripps Center for Marine Biodiversity and Conservation, and confirmed by Andrew Gooday of the UK National Oceanography Center.

"As one of very few taxa found exclusively in the deep sea, the xenophyophores are emblematic of what the deep sea offers. They are fascinating giants that are highly adapted to extreme conditions but at the same time are very fragile and poorly studied," said Levin. "These and many other structurally important organisms in the deep sea need our stewardship as human activities move to deeper waters."

*Provided by University of California - San Diego*

***http://www.nytimes.com/2011/10/24/science/24loops.html?partner=rss&emc=rss***

## A Hearing Aid That Cuts Out All the Clatter

***Hearing loops are being placed in subway fare booths in New York in what will be the largest installation in the United States.***

**By JOHN TIERNEY**

After he lost much of his hearing last year at age 57, the composer Richard Einhorn despaired of ever really enjoying a concert or musical again. Even using special headsets supplied by the Metropolitan Opera and Broadway theaters, he found himself frustrated by the sound quality, static and interference.

Then, in June, he went to the Kennedy Center in Washington, where his "Voice of Light" oratorio had once been performed with the National Symphony Orchestra, for a performance of the musical "Wicked."

There were no special headphones. This time, the words and music were transmitted to a wireless receiver in Mr. Einhorn's hearing aid using a technology that is just starting to make its way into public places in America: a hearing loop.

"There I was at 'Wicked' weeping uncontrollably — and I don't even like musicals," he said. "For the first time since I lost most of my hearing, live music was perfectly clear, perfectly clean and incredibly rich."

His reaction is a common one. The technology, which has been widely adopted in Northern Europe, has the potential to transform the lives of tens of millions of Americans, according to national advocacy groups. As loops are installed in stores, banks, museums, subway stations and other public spaces, people who have felt excluded are suddenly back in the conversation.

A hearing loop, typically installed on the floor around the periphery of a room, is a thin strand of copper wire radiating electromagnetic signals that can be picked up by a tiny receiver already built into most hearing aids and cochlear implants. When the receiver is turned on, the hearing aid receives only the sounds coming directly from a microphone, not the background cacophony.

"It's the equivalent of a wheelchair ramp for people who used to be socially isolated because of their hearing loss," said David G. Myers, a professor of psychology at Hope College in Holland, Mich., who is hard of hearing. "I used to detest my hearing aids, but now that they serve this second purpose, I love the way they've enriched my life."

After his first encounter with a hearing loop at an abbey in Scotland, where he was shocked to suddenly be able to understand every word of a service, Dr. Myers installed a loop in his own home and successfully campaigned to have loops installed at hundreds of places in Michigan, including the Grand Rapids airport and the basketball arena at Michigan State University.

"One of the beauties of this simple technology is that it serves me everywhere from my office to my home TV room to nearly all the worship places and public auditoriums of my community," Dr. Myers said.

**T**he Midwest has been in the vanguard, but New York is starting to catch up. Loops have been installed at the ticket windows of Yankee Stadium and Citi Field, at the Apple store in SoHo and at exhibits and information kiosks at Ellis Island, the Metropolitan Museum of Art and the American Museum of Natural History.

Even in that infamous black hole of acoustics — the New York subway system — loops are being placed in about 500 fare booths, in what will be the largest installation in the United States.

"This isn't just about disability rights — it's about good customer service," said Janice Schacter Lintz, the head of the Hearing Access Program, a group in New York promoting the loops.

"The baby boomers turn 65 this year," Ms. Schacter Lintz said, noting that more than 30 percent of people over 65 have hearing loss. "That's a big group of customers who won't go to museums or theaters or restaurants where they can't hear. Put in a loop, and they can hear clearly without any of the bother or embarrassment of wearing a special headset."

The basic technology, called an induction loop, has been around for decades as a means of relaying signals from a telephone to a tiny receiver called a telecoil, or t-coil, that can be attached to a hearing aid. As telecoils became standard parts of hearing aids in Britain and Scandinavia, they were also used to receive signals from loops connected to microphones in halls, stores, taxicabs and a host of other places.

People in the United States have been slower to adopt the technology because telecoils were traditionally sold as an optional accessory, at an extra cost of about $50, instead of being included automatically with a

hearing aid. But today telecoils are built into two-thirds of the hearing aids on the market as well as in all cochlear implants, so there is a growing number of people able to benefit from loops.

Hearing loop systems are more complicated to install than the assistive-hearing systems commonly used in theaters and churches, which beam infrared or FM signals to special headsets or neck loops that must be borrowed from the hall. Installing a loop in an auditorium typically costs $10 to $25 per seat, an initial investment that discourages some facility managers. But advocates for the loops argue that the cost per user is lower over the long run.

"The joke among my friends is that the loop system sounds too good to be true, but it is," said Christine Klessig, a retired lawyer living near Stevens Point in central Wisconsin. "Before they installed a loop at the public library, I had to sit in the front row at lectures and try to lip-read because I missed so many words. Now I sit wherever I want and hear everything."

The Hearing Loss Association of America, the largest group representing people with hearing problems, has joined with the American Academy of Audiology in a campaign to make loops more common in the United States. The technology is a cost-efficient way to provide benefits that even the most expensive hearing aids cannot deliver, said Patricia Kricos, an audiologist at the University of Florida and a past president of the American Academy of Audiology.

"Audiologists have always had a lot of faith in new high-tech hearing aids and cochlear implants, which are wonderful, but we're coming to realize that these work primarily in relatively quiet places without a lot of reverberation and noise," Dr. Kricos said. "In many settings, like a train station, they can't give you the crystal-clear clarity that you can get from a hearing loop."

In the pre-loop days at Dr. Myers's church in Michigan, the assistive-hearing headsets were rarely used by more than a single person at any service. Other worshipers were dissuaded by the inconvenience and embarrassment, he said. Shortly after the loop was installed, 10 people told him they were using it, and the number has been growing as more people get hearing aids that work with the system.

"If we build it, they will come," Dr. Myers said. "I see no reason why what's happened here in West Michigan can't happen across America."