http://www.eurekalert.org/pub_releases/2011-07/uoic-isl072511.php

Illinois scientists learn startling new truth about sugar

URBANA – ***Flying in the face of years of scientific belief, University of Illinois researchers have demonstrated that sugar doesn't melt, it decomposes.***

"This discovery is important to food scientists and candy lovers because it will give them yummier caramel flavors and more tantalizing textures. It even gives the pharmaceutical industry a way to improve excipients, the proverbial spoonful of sugar that helps your medicine go down," said Shelly J. Schmidt, a University of Illinois professor of food chemistry.

In a presentation to the Institute of Food Technologists about the importance of the new discovery, Schmidt told the food scientists they could use the new findings to manipulate sugars and improve their products' flavor and consistency.

"Certain flavor compounds give you a nice caramel flavor, whereas others give you a burnt or bitter taste. Food scientists will now be able to make more of the desirable flavors because they won't have to heat to a 'melting' temperature but can instead hold sugar over a low temperature for a longer period of time," she said.

Candy makers will be able to use a predictable time-temperature relationship, as the dairy industry does in milk pasteurization, to achieve better results, she said.

Schmidt and graduate student Joo Won Lee didn't intend to turn an established rule of food science on its head. But they began to suspect that something was amiss when they couldn't get a constant melting point for sucrose in the work that they were doing.

"In the literature, the melting point for sucrose varies widely, but scientists have always blamed these differences on impurities and instrumentation differences. However, there are certain things you'd expect to see if those factors were causing the variations, and we weren't seeing them," Schmidt said.

The scientists determined that the melting point of sugar was heating-rate dependent.

"We saw different results depending on how quickly we heated the sucrose. That led us to believe that molecules were beginning to break down as part of a kinetic process," she said.

Schmidt said a true or thermodynamic melting material, which melts at a consistent, repeatable temperature, retains its chemical identity when transitioning from the solid to the liquid state. She and Lee used high-performance liquid chromatography to see if sucrose was sucrose both before and after "melting." It wasn't.

"As soon as we detected melting, decomposition components of sucrose started showing up," she said.

To distinguish "melting" caused by decomposition from thermodynamic melting, the researchers have coined a new name—"apparent melting." Schmidt and her colleagues have shown that glucose and fructose are also apparent melting materials.

Another of Schmidt's doctoral students is investigating which other food and pharmaceutical materials are apparent melters. She says the list is growing every day.

Having disposed of one food science mystery, Schmidt plans to devote time to others. For instance, staling intrigues her. "We could ship a lot more food around the world if we could stabilize it, keep it from getting stale," she said.

Or there's hydrate formation, which can make drink mixes clumpy if they're open for a while. "We've observed the results—clumping under conditions of low relative humidity—but we really don't know why it happens," she noted.

Schmidt said that new instruments are making it possible to probe some of the processes scientists have taken for granted in a way they couldn't do before.

Four studies describing Schmidt's research have been published in recent issues of the Journal of Agricultural and Food Chemistry. Co-authors of the first, third, and fourth articles are Joo Won Lee of the U of I and Leonard C. Thomas of DSC Solutions. Joo Won Lee, John Jerrell, Hao Feng, and Keith Cadwallader, all of the U of I, and Leonard C. Thomas of DSC Solutions co-authored the second article.

http://www.eurekalert.org/pub_releases/2011-07/mdib-dpt072511.php

Discovery places turtles next to lizards on family tree

MicroRNA resolves an old issue

BAR HARBOR − Famous for their sluggishness, turtles have been slow to give up the secrets of their evolution and place on the evolutionary tree. For decades, paleontologists who study fossils and molecular biologists who study genetics have disagreed about whether turtles are more closely related to birds and crocodiles or to lizards. Now, two scientists from the Mount Desert Island Biological Laboratory in Bar Harbor, Maine, and their colleagues from Dartmouth College and Harvard and Yale Universities have developed a new technique for classifying animals, and the secret is out. Turtles are closer kin to lizards than crocodiles.

To reach their conclusion, published in Nature News and Biology Letters, the research team looked at a newly discovered class of molecules called microRNA. Most of the genetic material or DNA that scientists study provides the code for building proteins, large molecules that form an essential part of every organism. But microRNAs are much smaller molecules that can switch genes on and off and regulate protein production. They are also remarkably similar within related animal groups and provide important clues for identification.

"Different microRNAs develop fairly rapidly in different animal species over time, but once developed, they then remain virtually unchanged," said Kevin Peterson, a paleobiologist at MDIBL and Dartmouth College. "They provide a kind of molecular map that allows us to trace a species' evolution."

Peterson worked with Ben King, a bioinformatician at MDIBL. "My role in the study was to enhance our software so we could find new and unique microRNAs in the lizard genome," King said. "We identified 77 new microRNA families, and four of these turned out to also be expressed in the painted turtle. So we had the evidence we needed to say that turtles are a sister group to lizards and not crocodiles."

Though few creatures have been as puzzling as the turtle, the research team plans to use its microRNA analysis on other animals to help determine their origins and relationships as well. It is also developing a web-based platform to share the software with other researchers around the world.

In addition to King and Peterson, the research team included Tyler Lyson and Jacques Gauthier from Yale University, Eric Sperling from Harvard University, and Alysha Heimberg from Dartmouth College.

http://www.eurekalert.org/pub_releases/2011-07/tu-ssm072211.php

Study: Some moms 'doppelgang' their daughters' style

Mothers have a stronger tendency to mimic their daughters' consumption behavior than vice versa

How much do our children influence our consumption behavior? Much more than we thought.

A new study by a Temple University Fox School of Business professor finds that teenage girls have a strong influence on the products their mothers buy solely for personal use, as in makeup or clothing, and that mothers have a much stronger tendency to mimic their daughters' consumption behavior than vice versa.

"This finding provides initial support for the notion of reverse socialization and suggests that the impact adolescents have on their parents is much more profound than has been credited to them," Dr. Ayalla A. Ruvio, lead author and an assistant professor of marketing, writes in a forthcoming Journal of Consumer Behavior article.

This phenomenon – an intentional decision-making process of whom to mimic and how – produced a new term and inspired the article's title: the consumer doppelganger effect.

"It is not merely the mimicking act that is conscious," the researchers wrote of the consumer doppelganger effect. "The findings clearly indicate that the subjects intentionally choose the figure they want to emulate and report their inclination to mimic their consumption behavior."

The researchers analyzed whether teenage girls tend to emulate their mothers' consumption behavior or whether mothers mimic their daughters. The study, conducted through questionnaires, sampled 343 mother-daughter pairs, with an average age of 44 for the mothers and 16 for the daughters. The researchers found that if a mother is young at heart, has high fashion consciousness and views her daughter as a style expert, she will tend to doppelgang her daughter's consumption behavior.

However, even if the daughter has high interest in fashion and an older cognitive age –thinking she's older than she is – she still is less likely to view her mother as a consumer role model and to doppelgang her.

According to the researchers, the mother-daughter model is the first to test "bidirectional influence," or whether the consumer doppelganger effect can go both ways. Ruvio and her colleagues integrated "two streams of research," the study of mimicry and literature on role modeling, to demonstrate that "children affect their parents' consumption behavior with regard to the products that the parents themselves consume."

http://www.eurekalert.org/pub_releases/2011-07/wfbm-pod072511.php

Predictors of dying suddenly versus surviving heart attack identified

WINSTON-SALEM, N.C. ***Is it possible to predict whether someone is likely to survive or die suddenly from a heart attack?***

A new study by researchers at Wake Forest Baptist Medical Center has answered just that.

"For some people, the first heart attack is more likely to be their last," said Elsayed Z. Soliman, M.D., M.Sc., M.S., director of the Epidemiological Cardiology Research Center (EPICARE) at Wake Forest Baptist and lead author of the study. "For these people especially, it is important that we find ways to prevent that first heart attack from ever happening because their chances of living through it are not as good."

While there are many traits that are common among heart attack patients – both those who survive the event and those who die suddenly – researchers found that some traits, such as hypertension, race/ethnicity, body

mass index (BMI), heart rate, and additional markers that can be identified by an electrocardiogram (ECG) can differentiate between dying suddenly versus living through a heart attack, Soliman said.

The study, published by the journal Heart, is now available online.

Somewhere between 230,000 and 325,000 people in the U.S. succumb to sudden cardiac death every year, Soliman said. Most of these sudden deaths are caused by coronary heart disease.

"Since sudden cardiac death usually occurs before patients ever make it to the hospital, there is very little that can be done to save them," Soliman said. "Identifying specific predictors that separate the risk of sudden cardiac death from that of non-fatal or not immediately fatal heart attacks would be the first step to address this problem, which was the basis for our study."

Researchers analyzed data from two of the largest U.S. cardiovascular studies – the ARIC (Atherosclerosis Risk in Communities) and the CHS (Cardiovascular Health Study) – containing records for more than 18,000 participants. After taking into account common risk factors for coronary heart disease and the competing risk of sudden cardiac death with coronary heart disease, they found that:

Black race/ethnicity (compared to non-black) was predictive of high sudden cardiac death risk, but less risk of coronary heart disease.

Hypertension and increased heart rate were stronger predictors of high risk of sudden cardiac death compared to coronary heart disease.

Extreme high or low body mass index was predictive of increased risk of sudden cardiac death but not of coronary heart disease.

Additional, more technical traits that a doctor evaluating an ECG report could use to evaluate risk of sudden cardiac death in their patients. (Prolongation of QTc and abnormally inverted T wave were stronger predictors of high risk of sudden cardiac death. On the other hand, elevated electrocardiographic ST height in V2 was not predictive of sudden cardiac death but predictive of coronary heart disease.)

If the results are validated and confirmed in other studies, Soliman predicts that doctors will have a way to identify patients who are at greater risk of dying suddenly if they experience a heart attack and, therefore, a group of patients for whom early intervention, including risk factor modification, may be a life-saving option.

"Our next step in this path of research is to see if we can come up with a risk stratification score that can be applied to the general population, as well as to look at interventions that reverse the effect that these traits are having on susceptibility to sudden cardiac death," Soliman said. "We need to know if lowering hypertension, BMI or resting heart rate would reduce the risk of dying suddenly."

The study was funded by the Donald W. Reynolds Cardiovascular Clinical Research Center at the Johns Hopkins University School of Medicine. The ARIC and CHS studies are supported by the National Heart, Lung, and Blood Institute.

Soliman's co-authors on the study are: Gregory L. Burke, M.D., M.Sc., Ronald J. Prineas, MBBS, Ph.D., L. Douglas Case, Ph.D., and Gregory Russell, M.S., of Wake Forest Baptist; Bruce M. Psaty, M.D., Ph.D., David Siscovick, M.D., Thomas Rea, M.D., Nona Sotoodehnia, M.D., of the University of Washington; Wayne Rosamond, Ph.D., of the University of North Carolina at Chapel Hill; and Wendy S. Post, M.D., of Johns Hopkins University School of Medicine.

http://www.eurekalert.org/pub_releases/2011-07/nsf-dib072511.php

Diamond impurities bonanza for geologists studying Earth's history

Ancient minerals tell story of planet's distant past

Jewelers abhor diamond impurities, but they are a bonanza for scientists.

Safely encased in super-hard diamond, impurities are unaltered, ancient minerals that tell the story of Earth's distant past.

Researchers analyzed data from more than 4,000 of these mineral inclusions to find that continents started the cycle of breaking apart, drifting, and colliding about three billion years ago.

The research results, published in this week's issue of the journal Science, pinpoint when this so-called Wilson cycle began.

Lead author Steven Shirey of the Carnegie Institution's Department of Terrestrial Magnetism says that the Wilson cycle is responsible for the growth of the Earth's continental crust, the continental structures we see today, the opening and closing of ocean basins through time, mountain building, and the distribution of ores and other materials in the crust. "But when it all began has remained elusive until now," Shirey says.

"We used the impurities, or inclusions, contained in diamonds, because they are perfect time capsules from great depth beneath the continents.

"They provide age and chemical information for a span of more than 3.5 billion years that includes the evolution of the atmosphere, the growth of the continental crust, and the beginning of plate tectonics."

Co-author Stephen Richardson of the University of Cape Town says that it's "astonishing that we can use the smallest mineral grains that can be analyzed to reveal the origin of some of Earth's largest geological features."

"The tiny inclusions found inside diamonds studied by this team have recorded the chemistry and evolution of the Earth over 3.5 billion years," says Jennifer Wade, program director in the National Science Foundation (NSF)'s Division of Earth Sciences, which funded the research. "They help pinpoint when the cycle of plate tectonics first began on Earth."

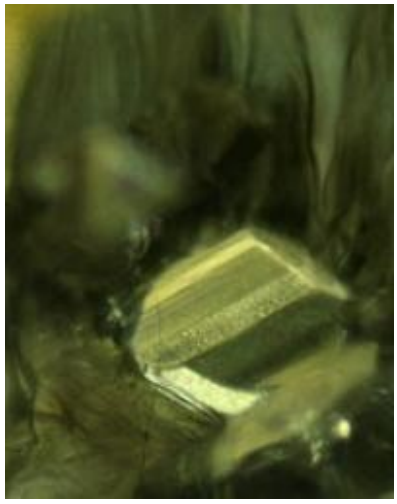
The largest diamonds come from cratons, the most ancient formations within continental interiors that have deep mantle roots or keels around which younger continental material gathered.

Cratons contain the oldest rocks on the planet, and their keels extend into the mantle more than 125 miles where pressures are sufficiently high, but temperatures sufficiently low, for diamonds to form and be stored for billions of years.

Over time, diamonds have arrived at the surface as accidental passengers during volcanic eruptions of deep magma that solidified into rocks called kimberlites.

The inclusions in diamonds come in two major varieties: peridotitic and eclogitic.

Peridotite is the most abundant rock type in the upper mantle, whereas eclogite is generally thought to be the remnant of oceanic crust recycled into the mantle by the subduction or sinking of tectonic plates.



The hexagonal grain of iron sulfide may be removed for analysis to reveal the diamond's age. Jeffrey Harris, University of Glasgow

Shirey and Richardson reviewed the data from more than 4,000 inclusions of silicate--the Earth's most abundant material--and more than 100 inclusions of sulfide from five ancient continents.

The most crucial aspects, they say, looked at when the inclusions were encapsulated and the associated compositional trends.

Compositions vary and depend on the geochemical processing that precursor components underwent before they were encapsulated.

Two systems used to date inclusions were compared. Both rely on natural isotopes that decay at exceedingly slow but predictable rates--about one disintegration every ten years on the scale of an inclusion--making them excellent atomic clocks for determining absolute ages.

The researchers found that before 3.2 billion years ago, only diamonds with peridotitic compositions formed, whereas after three billion years ago, eclogitic diamonds dominated.

"The simplest explanation," says Shirey, "is that this change came from the initial subduction of one tectonic plate under the deep mantle keel of another as continents began to collide on a scale similar to that of the supercontinent cycle today.

"The sequence of underthrusting and collision led to the capture of eclogite in the subcontinental mantle keel along with the fluids that are needed to make diamond."

Concludes Richardson, "This transition marks the onset of the Wilson cycle of plate tectonics."

http://www.eurekalert.org/pub_releases/2011-07/sumc-sdp072111.php

Scientists discover potential stroke treatment that may extend time to prevent brain damage

A naturally occurring substance shrank the size of stroke-induced lesions in the brains of experimental mice — even when administered as much as 12 hours after the event

STANFORD, Calif. — A naturally occurring substance shrank the size of stroke-induced lesions in the brains of experimental mice — even when administered as much as 12 hours after the event, Stanford University School of Medicine researchers have shown. The substance, alpha-B-crystallin, acts as a brake on the immune system, lowering levels of inflammatory molecules whose actions are responsible for substantial brain damage above and beyond that caused by the initial oxygen deprivation of a stroke.

The finding, which will be published online July 25 in Proceedings of the National Academy of Sciences, is of great potential significance. Every year brings nearly 800,000 new stroke patients in North America. "That's one every 40 seconds," said Gary Steinberg, MD, PhD, director of Stanford's Institute for Neuro-Innovation and Translational Neurosciences and one of the study's two senior authors. Steinberg is also the Bernard and Ronni Lacroute-William Randolph Hearst Professor of Neurosurgery and the Neurosciences, and chair of neurosurgery at the medical school.

The largest single cause of severe neurological disability and the third-leading cause of death in the United States, stroke accounts for an estimated $74 billion annually in related costs, including treatment and additional assistance for the three of every four stroke patients whose ability to perform the activities of daily life is impaired. Strokes are caused by a sudden drop in the flow of blood to the brain resulting from a clot or, less

often, bleeding. One of every three stroke patients is under the age of 65. In all, there are 5.4 million stroke survivors in the United States and 15 million worldwide.

The only currently approved drug for stroke — tissue plasminogen activator, or tPA — dissolves clots that keep oxygenated blood from reaching brain tissue. To be effective, tPA must be administered within about 4.5 hours after the stroke. But patients' brains must first be scanned to rule out the possibility that the stroke was caused by bleeding, which tPA would exacerbate, rather than by blockage.

Moreover, tPA does nothing to counter the stroke's insidious inflammatory aftershock: a flood of noxious chemicals secreted by angry immune cells that rush in to the affected area, causing significant further damage.

Alpha-B-crystallin appears to act as a sponge, sopping up those bad actors and stopping inflammation from making a bad situation worse.

Alpha-B-crystallin is a major structural protein in the eye's lens. It is also constantly made in the heart. In other tissues, including the brain, its production can be triggered by stressful events, such as oxygen deprivation or excessive heat or cold. Growing evidence suggests that alpha-B-crystallin can help curb inflammatory activity in the brain.

"The brain doesn't roll over and play dead when it's under attack," said Lawrence Steinman, MD, the other senior author of the new study, who is the George A. Zimmermann Professor of Neurology and Neurological Sciences and Pediatrics as well as chair of Stanford's interdepartmental program in immunology.

In an earlier study, published in Nature in 2007, Steinman and his colleagues found that the presence of alpha-B-crystallin could help reduce the severity of brain damage caused by multiple sclerosis, a chronic, debilitating autoimmune disease of the brain. Other studies published this year by his group have shown that alpha-B-crystallin limits the damage caused by blood-supply cutoffs to heart tissue and the retina.

It seemed logical to see if this protein could mitigate the effects of a stroke. "We made a jump from its relevance in inflammatory diseases such as multiple sclerosis," Steinberg said. "To my knowledge, nobody had looked at concentrations of alpha-B-crystallin after a stroke, either in people or in an experimental animal model before."

So, along with first authors Ahmet Arac, MD, a postdoctoral scholar in Steinberg's lab, and Steinman's former graduate student Sarah Brownell, PhD, Steinberg and Steinman turned to a standard animal model: the laboratory mouse. They found that, in mice bioengineered to lack alpha-B-crystallin, experimentally induced stroke lesions were more massive than those induced in otherwise genetically similar mice whose cells were capable of making the protein. The alpha-B-crystallin-deficient mice had worse neurological function after the stroke than did the normal mice.

The researchers also found that supplying synthetic alpha-B-crystallin to the deficient mice reduced brain-lesion sizes after a stroke, even when the substance was administered 12 hours after the stroke was induced. And they saw elevated alpha-B-crystallin levels in blood plasma from both human patients and mice after a stroke. (The human samples were obtained from study co-author Gregory Albers, MD, the Coy Foundation Professor of Neurology and Neurological Sciences and the director of the Stanford Stroke Center).

"In younger patients, the larger the stroke, the higher the concentration of alpha-B-crystallin," said Steinberg. Interestingly, increased alpha-B-crystallin levels were not detected in plasma from patients over the age of 80, whose strokes typically have worse consequences than those affecting younger patients.

Finally, the investigators demonstrated that alpha-B-crystallin-treated mice produce fewer inflammatory immune-signaling molecules and more anti-inflammatory ones than untreated mice.

At the doses given to the mice in this study, alpha-B-crystallin appeared to be nontoxic. "This is a naturally occurring molecule the body is already producing, although maybe just not enough of it," said Steinberg. "We're just supplementing it." If further studies by other labs and in other models confirm and extend the findings, alpha-B-crystallin may be an excellent candidate for clinical trials in stroke, Steinman and Steinberg both said.

"This is the first demonstration of an efficacious brain-protecting agent that targets the inflammatory aspect of stroke in a novel way, and it can be given at quite a delay," said Thomas Carmichael, MD, PhD, professor and vice chair of neurology at the David Geffen School of Medicine at UCLA. Carmichael, a stroke expert, did not participate in the study but is familiar with its methodology and results. "Tissue plasminogen activator has a fairly narrow risk-to-benefit ratio. The longer you wait, the more likely it is to stimulate a hemorrhage."

Other Stanford co-authors were Jonathan Rothbard, PhD, a senior research associate in Steinman's lab; Charlene Chen, MD, a fellow at the Stanford Stroke Center; and postdoctoral scholars Rose Ko, PhD, and Marta Pereira, PhD. The study was sponsored by the Russell and Elizabeth Siegelman, Bernard and Ronni Lacroute and William Randolph Hearst foundations; the National Multiple Sclerosis Society; and the National Institutes of Health.

http://www.newscientist.com/article/mg21128224.000-age-no-excuse-for-failing-to-learn-a-new-language.html

Age no excuse for failing to learn a new language

22 July 2011 by Catherine de Lange

IT'S never too late to learn another language.

Surprisingly, under controlled conditions adults turn out to be better than children at acquiring a new language skill.

It is widely believed that children younger than 7 are good at picking up new languages because their brains rewire themselves more easily, and because they use what is called procedural, or implicit, memory to learn - meaning they pick up a new language without giving it conscious thought. Adults are thought to rely on explicit memory, whereby they actively learn the rules of a language.

But some linguists now question whether this apparent difference in language-learning ability reflects our attitudes to young children and adults rather than differences in the brain. "If adults make a mistake we don't correct them because we don't want to insult them," says Sara Ferman of Tel Aviv University, Israel.

Ferman and Avi Karni from the University of Haifa, Israel, devised an experiment in which 8-year-olds, 12-year-olds and adults were given the chance to learn a new language rule. In the made-up rule, verbs were spelled and pronounced differently depending on whether they referred to an animate or inanimate object.

Participants were not told this, but were asked to listen to a list of correct noun-verb pairs, and then voice the correct verb given further nouns. The researchers had already established that 5-year-olds performed poorly at the task, and so did not include them in the study. All participants were tested again two months later to see what they remembered.

"The adults were consistently better in everything we measured," says Ferman. When asked to apply the rule to new words, the 8-year-olds performed no better than chance, while most 12-year-olds and adults scored over 90 per cent. Adults fared best, and have great potential for learning new languages implicitly, says Ferman. Unlike the younger children, most adults and 12-year-olds worked out the way the rule worked - and once they did, their scores soared. This shows that explicit learning is also crucial, says Ferman, who presented the results at the International Congress for the Study of Child Language in Montreal, Canada, this week.

The results are exciting, says David Birdsong from the University of Texas, Austin - particularly the finding that children's pronunciation is inferior to that of older subjects.

But Robert DeKeyser at the University of Maryland in College Park warns that artificial experiments like this do not necessarily transfer to the real world. Even if adults are better at implicit learning, children are more likely to get the chance to learn implicitly.

http://well.blogs.nytimes.com/2011/07/25/really-the-claim-air-conditioning-can-cause-colds/?partner=rss&emc=rss

Really? The Claim: Air-Conditioning Can Cause Colds

By ANAHAD O'CONNOR

THE FACTS In the midst of a nasty heat wave, air-conditioning can make life so much easier to bear.

But some people believe that sudden drops in temperature can play havoc with the immune system. Others say air-conditioners act as germ-spewing machines, cultivating bacteria and viruses like petri dishes and then blasting and recirculating them in enclosed spaces.

As with colds and other respiratory ailments contracted in the wintertime, cold air itself is not the culprit — viruses are, said Dr. Ujwala Kaza, an allergist and immunologist at New York University Langone Medical Center.

Still, researchers at Cardiff University in Wales say it’s possible air-conditioners may contribute in some small way to respiratory infection. They extract moisture from the air, which can dry out the protective mucus that lines the nostrils, allowing viruses a better chance to become established in the nose.

One study in 2004 compared 920 adult women and found that those who worked in offices with central air-conditioning had higher rates of absence due to sickness and more visits to ear, nose and throat doctors than those without it. A similar study of almost 800 office workers in 1998 also found more symptoms of sickness in workers in air-conditioned offices, compared with workers in offices with natural ventilation.

THE BOTTOM LINE There is evidence that air-conditioned environments may contribute to colds, but it’s not definitive.

http://www.americanscientist.org/science/content1/13211

Doctors aim to stop pancreatic cancer before it forms

Focus on the cysts can lead to early treatment

By Meredith Cohn, The Baltimore Sun

Seeing a chance to stop one of the most deadly kinds of cancer before it forms, doctors at Johns Hopkins and at other hospitals around the nation are focusing on the common pancreatic cyst.

Up to 20 percent of pancreatic cancer begins as one of these small, fluid-filled brown lesions. And left to grow unabated, pancreatic cancer kills 95 percent of sufferers within five years.

"We have a wonderful opportunity to intervene at an early stage," Dr. Anne Marie Lennon, an assistant professor and director of a new Hopkins Multidisciplinary Pancreatic Cyst Program. "We can intervene like we do for polyps in the colon. We remove them and prevent cancer."

Hopkins has long been a center for pancreatic cancer treatment and research, along with hospitals in Indiana, Illinois, Massachusetts and elsewhere. But this is the first time Hopkins has dedicated staff to cysts that may become cancer. The program, formed in November, sees about 10 new patients a week.

A study last year published in the American Journal of Gastroenterology found that up to 13 percent of the population has a pancreatic cyst, though most do not become cancerous. Researchers studied patients who had undergone an MRI for a reason besides their pancreas, and such routine screening has become the main method of discovering pancreatic cysts. Doctors don't believe the number of cysts is growing — and they aren't even the biggest source of pancreatic cancer, which is less common than many other cancers. There are about 43,000 cases a year nationwide, compared to more than 200,000 cases each of breast, prostate and lung cancer.

But pancreatic cancer is among the most deadly, taking about 36,800 lives annually, according to the National Cancer Institute, and spotting it early is the only chance for a cure.

Paula Rhines is one of the Hopkins center's success stories. The 41-year-old sales representative, who lives in Fort Lauderdale, Fla., recently had an early cancerous tumor removed at Hopkins.

It was discovered during screening before Rhines had her gallbladder removed in 2006. Doctors in Florida watched the cyst over the years, and when it started growing they still didn't think it was dangerous. They advised her to seek a second opinion. After a Web search, she picked Hopkins, where doctors did a round of tests similar to the ones she'd had in Florida, including a CT scan, MRI, endoscopic ultrasound and biopsy.

But the Hopkins team found the results concerning and recommended surgery "sooner rather than later," Rhines said. In March, she had a 7.5-hour surgery called a Whipple, or a pancreaticoduodenectomy, in which the head of the pancreas and the tumor were removed, as well as the gallbladder, common bile duct and part of the small intestine. After the surgery, the lab confirmed the cyst was a type that grows within the pancreatic ducts and often develops into invasive pancreatic cancer.

"I feel like someone is looking after me," she said. "This would have progressed into something not good, but they took care of things before it became too late."

Though she's still a bit fatigued, she's now back to work, taking just an occasional Advil and expecting nothing more than a follow-up visit or two a year. Fatigue and trouble eating are the most common complaints after surgery, though they ease over time, said Dr. Christopher L. Wolfgang, an associate professor of surgery and oncology at Hopkins. He and Lennon said Rhines had pancreatitis after the gallbladder surgery, or inflammation of the pancreas, a gland housed behind the stomach that releases insulin to regulate blood sugar and digestive enzymes to help digest and absorb food.

Pancreatic cysts

- ***They are little fluid-filled brown lesions in the pancreas of up to 13 percent of people***
- ***Most are discovered through CT scans or MRIs for another purpose and are benign***
- ***Up to 20 percent of pancreatic cancer begins as a cyst, and unabated the disease kills 95 percent of sufferers in 5 years***
- ***Surgery for precancerous cysts and early cancerous tumors can cure the disease***

Sometimes pancreatitis is caused by a cyst or leads to one. Those caused by the condition are often pseudocysts, which are benign pockets of fluid that don't normally have to be removed. But those that can cause pancreatitis, like Rhines', are known to become cancerous. Those with pancreatitis need to be screened and considered for major surgery, the only method of removing the cysts, the doctors say.

But screening isn't for everyone, Wolfgang said. The cost of all that screening and the potential for unnecessary surgery is too great. For now, those who discover a cyst inadvertently should be evaluated. At Hopkins that would include seeing a team including gastroenterologists, surgeons, radiologists, pathologists and others in determining treatment.

There are guidelines for treatment of some of the more dangerous cysts, such as Rhines', developed by an international group of specialists, which included Wolfgang. The group is about to release a revised set, but the doctor says they still recommend the invasive surgery to ensure cancer — and the potential for the ailment —

are cut out. Those who are found to have cancer also generally undergo chemotherapy. They need regular screening because the chance of recurrence is high, Wolfgang said.

For now, there is no precise way to determine exactly who needs surgery, said Dr. C. Max Schmidt, an associate professor at Indiana University and director of the six-year-old Pancreatic Cyst & Cancer Early Detection Center, which sees 1,000 patients a year.

Researchers are investigating a genetic marker that would indicate a person's likelihood of developing pancreatic cancer, as is done with breast cancer. For now, Schmidt said he ranks patients based on the available tests. Those with low risk are monitored, and those with high risk are offered surgery.

He said those with certain cysts and those who have a family history of the cancer fall in the high-risk category. "We have two opportunities to cure or prevent cancer," he said of those patients.
Schmidt said he launched a new website called pancyst.org in an effort to reach people with symptoms or family history or who inadvertently discover a cyst so they get to a specialist. Symptoms include abdominal pain, nausea, vomiting and diarrhea. Sometimes, patients have yellowing skin or eyes because the bile duct is obstructed. There still are few clinics like Indiana's and Hopkins', though more university-linked hospitals are developing multidisciplinary programs to better assess cysts, Schmidt said.

"There has been so very little hope with this cancer, and that's the message that has been sent across the airwaves," he said. "And unfortunately, there really hasn't been well-coordinated screening across the country. But there is hope for these patients if we reach them and intervene."

http://medicalxpress.com/news/2011-07-brain-differences-humans-chimpanzees-linked.html

Brain differences between humans and chimpanzees linked to aging

Chimpanzees do not experience a decrease in brain volume as they age like humans do

Chimpanzees, the closest living relatives to humans, do not experience a decrease in brain volume as they age like humans do, according to a study by George Washington University researcher Chet Sherwood and his colleagues. There are many similarities between the species, but this discovery reveals an important distinction, demonstrating how humans are unique from other animals. The study "Aging of the Cerebral Cortex Differs Between Humans and Chimpanzees" is the first study of its kind in this field and will be published in the Proceedings of the National Academy of Sciences on July 25, 2011.

“Although other animals experience some cognitive impairment and brain atrophy as they age, it appears that human aging is marked by more dramatic degeneration,” said Dr. Sherwood, associate professor of anthropology in GW’s Columbian College of Arts and Sciences.
The researchers used magnetic resonance imaging (MRI) to measure the volume of the whole brain and numerous specific internal structures using a sample of 99 chimpanzee brains ranging from 10-51 years of age. This data were compared to brain structure volumes measured in 87 humans ranging from 22-88 years of age.

Measurements of the neocortical gray and white matter, frontal lobe gray and white matter and the hippocampus were performed. In contrast to humans, who showed a decrease in the volume of all brain structures over the lifespan, chimpanzees did not display significant age-related changes. Furthermore, the effects of aging in humans were only evident after the maximum age of chimpanzees. As a result, the researchers concluded that the brain shrinkage seen in human aging is evolutionarily novel and is the result of an extended lifespan.

The hippocampus, the area of the brain responsible for encoding new memories and maintaining spatial navigation, was of specific interest to the researchers, as this area is especially vulnerable to age-associated atrophy in humans. In addition, the hippocampus is the region of the brain most prominently affected by Alzheimer’s disease (AD), an illness that is only seen in primarily older humans. AD is a form of dementia that is associated with a loss of brain function, impacting memory, thinking and behavior. AD is a result of neurodegeneration, which is the progressive loss of structure or function of neurons, including the death of neurons. The unique vulnerability seen in humans to develop AD may be in part due to the human tendency to show more pronounced brain atrophy than any other species, even in normal, healthy aging.

“What’s really unusual for humans is the combination of an extremely long life and a large brain,” said Dr. Sherwood. “While there are certainly benefits to both of these adaptations, it seems that more intense decline in brain volume in the elderly of our species is a cost.”

Established in 1821 in the heart of the nation’s capital, the George Washington University Columbian College of Arts and Sciences is the largest of GW’s academic units. It encompasses the School of Media and Public Affairs, the Trachtenberg School of Public Policy and Public Administration and more than 40 departments and programs for undergraduate, graduate and professional studies. The Columbian College provides the foundation for GW’s commitment to the liberal arts and a broad education for all students. An

internationally recognized faculty and active partnerships with prestigious research institutions place Columbian College at the forefront in advancing policy, enhancing culture and transforming lives through research and discovery.

In the heart of the nation's capital with additional programs in Virginia, the George Washington University was created by an Act of Congress in 1821. Today, GW is the largest institution of higher education in the District of Columbia. The university offers comprehensive programs of undergraduate and graduate liberal arts study, as well as degree programs in medicine, public health, law, engineering, education, business and international affairs. Each year, GW enrolls a diverse population of undergraduate, graduate and professional students from all 50 states, the District of Columbia and more than 130 countries.

More information: *"Aging of the cerebral cortex differs between humans and chimpanzees," by Chet C. Sherwood et al. Provided by George Washington University*

http://www.physorg.com/news/2011-07-mitochondria-ancestor-sar11-globally-significant.html

Mitochondria share an ancestor with SAR11, a globally significant marine microbe

A recent study by researchers at the University of Hawaii, Manoa, and the Oregon State University provides strong evidence that mitochondria share a common evolutionary ancestor with a lineage of marine bacteria known as SAR11, arguably the most abundant group of microorganisms on Earth.

Billions of years ago, an astounding evolutionary event occurred: certain bacteria became obliged to live inside other cells, thus starting a chain of events that resulted in what is now the mitochondria, an organelle found in all eukaryotic cells.

A recent study by researchers at the University of Hawaii – Manoa (UHM) and the Oregon State University (OSU) provides strong evidence that mitochondria share a common evolutionary ancestor with a lineage of marine bacteria known as SAR11, arguably the most abundant group of microorganisms on Earth.

"This is a very exciting discovery," says Michael Rappe, Associate Researcher at the Hawaii Institute of Marine Biology in the School of Ocean and Earth Science and Technology (SOEST) at UHM. "The results that we present make sense in a lot of ways: the physiology of SAR11 makes them more apt to be dependent on other organisms, and based on the contemporary abundance of SAR11 in the global ocean, the ancestral lineage may have also been abundant in the ancient ocean, increasing encounters between this bacterial lineage with the host of the original symbiosis event."

In order to understand the evolutionary history of the SAR11 clade of marine bacteria, colleagues at Oregon State University compared the genomics of mitochondria from diverse supergroups of eukaryotes (including Excavata, Chromalveolata, and Archaeplastida) with the genomics of SAR11 strains isolated by Rappe's laboratory using several interconnected computer programs. This approach provided highly sophisticated and thorough phylogenetic analysis of these genomes.

In addition to discovering the evolutionary connection between mitochondria and SAR11, the phylogenomics-based assessment of the diversity of this group (i.e. an assessment based on the entire genome, rather than single genes) provided substantial support for proposing a new family of bacteria, Pelagibacteraceae, fam. nov. "The implication is that the lineage of highly abundant marine bacteria known as SAR11 contains a significant amount of genetic diversity, which potentially indicates significant diversity in metabolism," notes Rappe.

Rappe and colleagues at SOEST and OSU continue to grow new strains of SAR11 and probe their genomes to further understand their metabolic potential and how they have become so successful in the global ocean.

More information: *Nature Scientific Reports: Phylogenomic evidence for a common ancestor of mitochondria and the SAR11 clade, DOI:10.1038/srep00013 Provided by University of Hawaii*

http://www.eurekalert.org/pub_releases/2011-07/fj-htp072611.php

How testosterone protects against inflammation

Pharmacists of the University Jena analyze why men suffer more rarely from inflammatory diseases than women

Jena (Germany) It's all down to the testosterone: men are usually more muscular than women, they have deeper voices and more body hair. And – men are less susceptible to inflammatory diseases and allergies than women. This is also due to the male sex hormones as pharmacists at the Friedrich Schiller University Jena (Germany) have shown in a recent study.

"It is mostly women who are affected by diseases like rheumatoid arthritis, psoriasis or asthma", Professor Dr. Oliver Werz from the Jena University explains. Although this is a fact known for some time, the reasons for these differences are largely unknown. As the Jena Professor for pharmaceutical and medical chemistry and his

team have revealed now, sexual hormones play an important role in this. The researchers report about this in the current edition of the scientific journal FASEB Journal (DOI: 10.1096/fj.11-182758).

"In a series of analyses we have shown that cells from men and women react in a different manner to inflammatory stimuli," Dr. Carlo Pergola from the Institute of Pharmacy of University Jena explains. Thus, certain immune cells of women produced nearly twice as many pro-inflammatory substances than those of men. Together with colleagues from Tübingen (Germany), Stockholm (Sweden) and Naples (Italy) the Jena researchers pursued the molecular basis for these differences and published their findings in their current study. To this aim, they isolated immune cells of male and female donors and analyzed in test tubes the activity of the enzymes responsible for the production of pro-inflammatory substances. They found that in male cells the enzyme phospholipase D is less active than in the female ones. "Interestingly, the activity of the enzyme is reduced after treatment with testosterone also in the female immune cells", Dr. Pergola defines a crucial result.

Based on these findings, the Jena pharmacists concluded that the male sex hormones play a key role in the modulation of the immune response. This would also explain another phenomenon that has been previously noticed, that is, testosterone can protect men from arteriosclerosis.

Most importantly, the new knowledge should be taken into account in the assessment of new therapies and drugs for inflammatory diseases, Professor Werz stresses. "New therapies are usually still more often being tested on male volunteers or patients". But the Jena study indicates now that the results derived from male subjects cannot be immediately transcribed to women. On the contrary, a 'customized' therapy for men and women would be important.

Original-Publication: *Pergola C. et al.: Testosterone suppresses phospholipase D, causing sex differences in leukotriene biosynthesis in human monocytes. The FASEB Journal 2011 (DOI: 10.1096/fj.11-182758)*

http://www.eurekalert.org/pub_releases/2011-07/uoc--acn072611.php

Are cancers newly evolved species?

Molecular biologist proposes that carcinogenesis is like speciation

Cancer patients may view their tumors as parasites taking over their bodies, but this is more than a metaphor for Peter Duesberg, a molecular and cell biology professor at the University of California, Berkeley.

Cancerous tumors are parasitic organisms, he said. Each one is a new species that, like most parasites, depends on its host for food, but otherwise operates independently and often to the detriment of its host.

In a paper published in the July 1 issue of the journal Cell Cycle, Duesberg and UC Berkeley colleagues describe their theory that carcinogenesis – the generation of cancer – is just another form of speciation, the evolution of new species.

"Cancer is comparable to a bacterial level of complexity, but still autonomous, that is, it doesn't depend on other cells for survival; it doesn't follow orders like other cells in the body, and it can grow where, when and how it likes," said Duesberg. "That's what species are all about."

This novel view of cancer could yield new insights into the growth and metastasis of cancer, Duesberg said, and perhaps new approaches to therapy or new drug targets. In addition, because the disrupted chromosomes of newly evolved cancers are visible in a microscope, it may be possible to detect cancers earlier, much as today's Pap smear relies on changes in the shapes of cervical cells as an indication of chromosomal problems that could lead to cervical cancer.

Carcinogenesis and evolution

The idea that cancer formation is akin to the evolution of a new species is not new, with various biologists hinting at it in the late 20th century. Evolutionary biologist Julian S. Huxley wrote in 1956 that "Once the neoplastic process has crossed the threshold of autonomy, the resultant tumor can be logically regarded as a new biologic species …."

Last year, Dr. Mark Vincent of the London Regional Cancer Program and University of Western Ontario argued in the journal Evolution that carcinogenesis and the clonal evolution of cancer cells are speciation events in the strict Darwinian sense.

The evolution of cancer "seems to be different from the evolution of a grasshopper, for instance, in part because the cancer genome is not a stable genome like that of other species. The challenging question is, what has it become?" Vincent said in an interview. "Duesberg's argument from karyotype is different from my argument from the definition of a species, but it is consistent."

Vincent noted that there are three known transmissible cancers, including devil facial tumor disease, a "parasitic cancer" that attacks and kills Tasmanian devils. It is transmitted from one animal to another by a whole cancer cell. A similar parasitic cancer, canine transmissible venereal tumor, is transmitted between dogs via a single cancer cell that has a genome dating from the time when dogs were first domesticated. A third transmissible cancer was found in hamsters. "Cancer has become a successful parasite," Vincent said.

Mutation theory vs. aneuploidy

Duesbeg's arguments derive from his controversial proposal that the reigning theory of cancer – that tumors begin when a handful of mutated genes send a cell into uncontrolled growth – is wrong. He argues, instead, that carcinogenesis is initiated by a disruption of the chromosomes, which leads to duplicates, deletions, breaks and other chromosomal damage that alter the balance of tens of thousands of genes. The result is a cell with totally new traits – that is, a new phenotype.

"I think Duesberg is correct by criticizing mutation theory, which sustains a billion-dollar drug industry focused on blocking these mutations," said Vincent, a medical oncologist. "Yet very, very few cancers have been cured by targeted drug therapy, and even if a drug helps a patient survive six or nine more months, cancer cells often find a way around it."

Chromosomal disruption, called aneuploidy, is known to cause disease. Down syndrome, for example, is caused by a third copy of chromosome 21, one of the 23 pairs of human chromosomes. All cancer cells are aneuploid, Duesberg said, though proponents of the mutation theory of cancer argue that this is a consequence of cancer, not the cause.

Key to Duesberg's theory is that some initial chromosomal mutation – perhaps impairing the machinery that duplicates or segregates chromosomes in preparation for cell division – screws up a cell's chromosomes, breaking some or making extra copies of others. Normally this would be a death sentence for a cell, but in rare cases, he said, such disrupted chromosomes might be able to divide further, perpetuating and compounding the damage. Over decades, continued cell division would produce many unviable cells as well as a few still able to divide autonomously and seed cancer.

Duesberg asserts that cancers are new species because those viable enough to continue dividing develop relatively stable chromosome patterns, called karyotypes, distinct from the chromosome pattern of their human host. While all known organisms today have stable karyotypes, with all cells containing precisely two or four copies of each chromosome, cancers exhibit a more flexible and unpredictable karyotype, including not only intact chromosomes from the host, but also partial, truncated and mere stumps of chromosomes.

"If humans changed their karyotype – the number and arrangement of chromosomes – we would either die or be unable to mate, or in very rare cases become another species," Duesberg said. But cancer cells just divide and make more of themselves. They don't have to worry about reproduction, which is sensitive to chromosomal balance. In fact, as long as the genes for mitosis are still intact, a cancer cell can survive with many disrupted and unbalanced chromosomes, such as those found in an aneuploid cell, he said.

The karyotype does change as a cancer cell divides, because the chromosomes are disrupted and thus don't copy perfectly. But the karyotype is "only flexible within a certain margin," Duesberg said. "Within these margins it remains stable, despite its flexibility."

Karyographs display karyotype variability

Duesberg and his colleagues developed karyographs as a way to display the aneuploid nature of a cell's karyotype and its stability across numerous cell cultures. Using these karyographs, he and his colleagues analyzed several cancers, clearly demonstrating that the karyotype is amazingly similar in all cells of a specific cancer line, yet totally different from the karyotypes of other cancers and even the same type of cancer from a different patient.

HeLa cells are a perfect example. Perhaps the most famous cancer cell line in history, HeLa cells were obtained in 1951 from a cervical cancer that eventually killed a young black woman named Henrietta Lacks. The 60-year-old cell line derived from her cancer has a relatively stable karyotype that keeps it alive through division after division.

"Once a cell has crossed that barrier of autonomy, it's a new species," Duesberg said. "HeLa cells have evolved in the laboratory and are now even more stable than they probably were when they first arose."

The individualized karyotypes of cancers resemble the distinct karyotypes of different species,, Duesberg said. While biologists have not characterized the karyotypes of most species, no two species are known that have the same number and arrangement of chromosomes, including those of, for example, gorillas and humans, who share 99 percent of their genes.

Duesberg argues that his speciation theory explains cancer's autonomy, immortality and flexible, but relatively stable, karyotype. It also explains the long latency period between initial aneuploidization and full blown cancer, because there is such a low probability of evolving an autonomous karyotype.

"You start with a chromosomal mutation, that is, aneuploidy perhaps from X-rays or cigarettes or radiation, that destabilizes and eventually changes your karyotype or renders it non-viable," he said. "The rare viable aneuploidies of cancers are, in effect, the karyotypes of new species."

Duesberg hopes that the carcinogenesis-equals-speciation theory will spur new approaches to diagnosing and treating cancer. Vincent, for example, suspects that cancers are operating right at the edge of survivability, maintaining genomic flexibility while retaining the ability to divide forever. Driving them to evolve even faster, he said, "might push them over the edge."

Duesberg's colleagues are postdoctoral fellow Daniele Mandrioli and research associate Amanda McCormack of UC Berkeley and graduate student Joshua M. Nicholson in the Department of Biological Sciences at Virginia Polytechnic Institute. Duesberg's research is funded by the Abraham J. and Phyllis Katz Foundation, philanthropists Dr. Christian Fiala, Rajeev and Christine Joshi, Robert Leppo and Peter Rozsa of the Taubert Memorial Foundation, other private sources and the Forschungsfonds der Fakultät für Klinische Medizin Mannheim der Universität Heidelberg.

http://www.eurekalert.org/pub_releases/2011-07/uoh-zlm072611.php

Zinc lozenges may shorten common-cold duration

Depending on the total dosage of zinc and the composition of lozenges, zinc lozenges may shorten the duration of common cold episodes by up to 40%, according to a study published in the Open Respiratory Medicine Journal.

For treating the common cold, zinc lozenges are dissolved slowly in the mouth. Interest in zinc lozenges started in the early 1980s from the serendipitous observation that a cold of a young girl with leukemia rapidly disappeared when she dissolved a therapeutic zinc tablet in her mouth instead of swallowing it. Since then over a dozen studies have been carried out to find out whether zinc lozenges are effective, but the results of those studies have diverged.

Dr. Harri Hemila of the University of Helsinki, Finland, carried out a meta-analysis of all the placebo-controlled trials that have examined the effect of zinc lozenges on natural common cold infections. Of the 13 trial comparisons identified, five used a total daily zinc dose of less than 75 mg and uniformly those five comparisons found no effect of zinc. Three trials used zinc acetate in daily doses of over 75 mg, with the average indicating a 42% reduction in the duration of colds. Five trials used zinc salts other than acetate in daily doses of over 75 mg, with the average indicating a 20% decrease in the duration of colds.

In several studies, zinc lozenges caused adverse effects, such as bad taste, but there is no evidence that zinc lozenges might cause long term harm. Furthermore, in the most recent trial on zinc acetate lozenges, there were no significant differences between the zinc and placebo groups in the occurrence of adverse effects although the daily dose of zinc was 92 mg. Dr. Hemila concluded that "since a large proportion of trial participants have remained without adverse effects, zinc lozenges might be useful for them as a treatment option for the common cold."

http://medicalxpress.com/news/2011-07-drug-shown-sight-patients-inherited.html

Drug shown to improve sight for patients with inherited blindness

A clinical trial led by Newcastle University shows that the drug, idebenone (Catena), improved the vision and perception of colour in patients with Leber's Hereditary Optic Neuropathy (LHON)

The inherited condition means patients, who can see normally, lose the sight in one eye then within 3 to 6 months lose the sight in their other eye.

In some severely affected patients such as those who were unable to read any letters on the chart, the treatment with idebenone resulted in a marked improvement in their vision. In nine patients (12 eyes) out of 36 patients (61 eyes) taking idebenone, vision improved to the extent that patients were able to read at least one row of letters on the chart. In contrast not a single patient of the 26 who were taking the placebo improved to that extent.

Inherited from the mother, and mainly affecting men, LHON is caused by damage to the mitochondria in the eyes – the 'batteries' which power their cells. It is one of the most common causes of inherited blindness and is thought to affect around 2,000 people in the UK, around 10,000 in Europe and a further 10,000 in the USA.

"This is the first proven treatment for a mitochondrial disorder. We have seen patients who couldn't even see an eye chart on the wall go on to read the first line down – and some even attempted the second line. For these patients, it can mean a vast improvement in their quality of life," said Professor Patrick Chinnery, a Wellcome Trust Senior Fellow in Clinical Science at Newcastle University who also works at the Royal Victoria Infirmary in Newcastle – part of the Newcastle upon Tyne Hospitals NHS Foundation Trust.

Released today in the journal Brain published by Oxford University Press, the authors describe how patients with LHON were recruited from Newcastle Hospitals in the UK, in Munich, Germany and in Montreal, Canada for a double blind trial. Patients were either given idebenone for 24 weeks or a placebo.

At the end of the six months, some patients who were taking idebenone had improved vision and this is the first time a successful treatment has been found. The greatest improvement was seen in patients who had deteriorated in one eye more than the other.

Professor Chinnery explained: "We saw most progress in people who had better vision in one eye than the other - this tends to indicate that they are at an earlier stage of the condition. While we know that their vision is not what it once was, we also know that this treatment can dramatically improve their lives – some were able to move around more easily or even see family photos again."

Idebenone penetrates into the mitochondria and is thought to mop-up toxic free radicals and enhance mitochondrial function. Previous research had provided anecdotal reports of improvements in vision but this is the first time it had been put to the test in a clinical trial. The drug company which sponsored this trial, Santhera Pharmaceuticals, is now seeking marketing approval from the European Medicines Agency for it to be offered as a standard form of treatment.

"We are hearing from patients that they still have improved vision – even though they are no longer taking the drug but we would like to verify this and study the effect further," said Professor Chinnery. "There may also be a case for offering idebenone from the first moment that LHON is diagnosed – preferably before any symptoms are shown - and a further trial would ideally examine this."

"I lost the sight in my left eye in just five days"

Mike Scholes, 58 from Lindfield in West Sussex, UK and a graduate of Newcastle University took part in the trial. He said: "I was training for a freefall parachute jump five years ago when I noticed I was having problems with my eye. I went for an eye test at the optician and on the way to pick up my glasses five days later, I nearly crashed the car. The optician tested my right eye and there was no problem, when he came to the left eye I asked him to switch on the machine - and he said he already had. I had lost the sight in my left eye in just five days.

"This meant an abrupt change in my life - I had a very successful hot air balloon business and I had to stop flying. I had to sell my cars as I could no longer drive.

"Following seven months of tests including CAT scans, X-Rays, MRI scans and a lumbar puncture, I was finally given a DNA test which revealed I had Leber's hereditary optic neuropathy.

"It was around this time that my vision started to go in my second eye. I couldn't see in an increasingly large area in the centre of my eyes and gradually colours disappeared. At worst the only colours I could make out were shades of blue. "Soon after friends spotted a clinical trial in Newcastle, I volunteered to take part and started taking the tablets three times a day – not knowing whether I was taking a placebo or the drug.

"After just a month and a half I noticed that the area affected in the centre of my vision was smaller. The improvement continued and I began to appreciate colours again seeing yellow and most reds.

"Having Leber's hasn't stopped me enjoying life to the full - I run marathons with a guide, I've hiked to the North pole - but the noticeable improvement in my vision means daily life is easier. I can use a computerised viewer to help me read, I can get dressed without having to use a detector for the colours of clothes and while initially I couldn't even see the eye chart, now if I get really close to a street sign I can read it."

More information: A randomized placebo-controlled trial of idebenone in Leber's hereditary optic neuropathy, Thomas Klopstock, Patrick Yu-Wai-Man, Konstantinos Dimitriadis, Jacinthe Rouleau, Suzette Heck, Maura Bailie, Alaa Atawan, Sandip Chattopadhyay, Marion Schubert, Aylin Garip, Marcus Kernt, Diana Petraki, Christian Rummey, Mika Leinonen, Günther Metz, Philip G Griffiths, Thomas Meier and Patrick F Chinnery. Brain 2011-00800.

For interested patients, further information can be seen here: *Provided by Newcastle University*

http://medicalxpress.com/news/2011-07-brain-voices-speech.html

Brain 'hears' voices when reading direct speech

(Medical Xpress) -- ***When reading direct quotations, the brain 'hears' the voice of the speaker, say scientists.***

It is a finding long accepted as evident but never scientifically investigated, according to researcher Dr. Christoph Scheepers from the University of Glasgow.

Now a team from the University's Center for Cognitive Neuroimaging (CCNi) has established that reading direct speech activates 'voice-selective areas' of the brain.

Dr. Scheepers said: "Although many of us share the intuition of an 'inner voice', particularly during silent reading of direct speech statements in text, there has been little direct empirical confirmation of this experience so far. Few researchers have addressed the question of how the two reporting styles are represented in language comprehension, though direct speech demonstration is generally assumed to be more vivid and perceptually engaging than an indirect speech description."

Dr. Scheepers and his team enlisted 16 participants in the study and scanned their brains using Functional Magnetic Resonance Imaging (fMRI) while they read different short stories. The results show that direct quotes activated voice-selective areas of the auditory cortex.

Dr. Scheepers added: “This reveals that readers are more likely to engage in perceptual simulations, or spontaneous imagery, of the reported speaker’s voice when reading direct speech. Several recent theories have proposed that people mentally simulate linguistically-described situations based on generalized experiences they have had in the past. Crucially, aspects of the reported speaker’s voice are very likely to be part of this perceptual stimulation process.”

Scientists have already shown that some areas of the auditory cortex are selectively sensitive to human voices when stimulated ‘bottom-up’ – that is to say, by an actual sound perceived by the ears.

However, other experiments have shown that the same areas can be stimulated by non-auditory stimuli – such as lip-reading. Now silent reading has been shown to do the same thing.

The research paper ‘Silent reading of direct vs. indirect speech activates voice-selective areas in the auditory cortex’ is published in the latest edition of the journal Cognitive Neuroscience.

Provided by University of Glasgow

http://www.scientificamerican.com/article.cfm?id=rare-volcanoes-discovered

Rare Volcanoes Discovered on Moon's Far Side

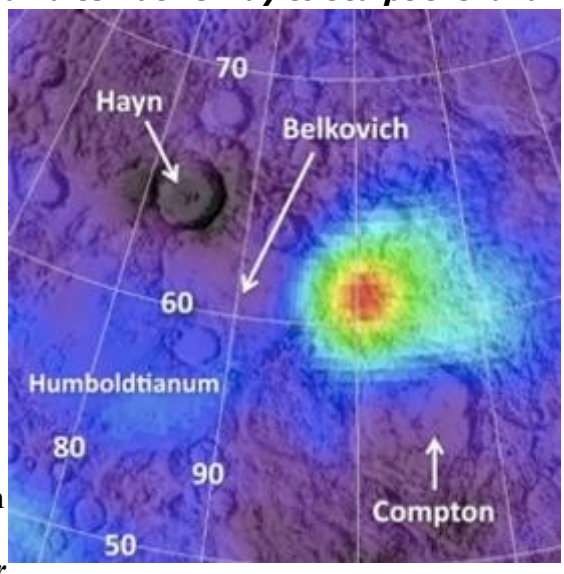
The dormant volcanoes on the far side of the moon offer an alternative way to sculpt the lunar surface

By Nola Taylor Redd and SPACE.com

Shielded from Earth-bound eyes, the far side of the moon is home to a rare set of dormant volcanoes that changed the face of the lunar surface, a new study finds.

Data and photos from NASA's Lunar Reconnaissance Orbiter (LRO) reveal the presence of now-dead silicate volcanoes, not the more common basaltic volcanoes that litter the moon's surface, researchers said.

"Most of the volcanic activity on the moon was basaltic," primary author Brad Jolliff of Washington University told SPACE.com in an email. "Finding other volcanic types is interesting as it shows the geologic complexity and range of processes that operate on the moon, and how the moon's volcanism changed with time."



LUNAR VOLCANOES: ***This image from NASA's Lunar Reconnaissance Orbiter shows a region on the far side of the moon between the Compton and Belkovich craters. The colored region marks a high amount of the mineral thorium, which is thought to have been deposited by rare silicate volcanoes in the past.*** **Image: NASA/GSFC/ASU/WUSTL, processing by B. Joliff**

Searching the far side

Because the moon's rotation has been affected by tidal forces between Earth and the moon, only one side of the moon is visible from Earth. The far side of the moon - sometimes referred to inaccurately as the "dark side" - was hidden from view until 1959, when Soviet Union's Luna 3 spacecraft took the first photos of the region.

When NASA's Lunar Prospector probe circled the moon in 1998, it revealed a highly reflective plain lying between two ancient impact craters. Known as the Compton-Belkovich region, this part of the moon contains thorium and other silicate rocks, suggesting a more involved type of volcanic activity than that which created the moon's well-known dark plains of basaltic plains known as "maria," or "seas."

But it wasn't until the LRO captured higher-resolution images for the region could this volcanic activity be confirmed. The spacecraft found a number of domelike features with steeply sloping sides - telltale signs of lunar volcanoes.

Jolliff said that the domes likely formed by lava probably came from deep within the moon. It flowed upward through cracks to pool just beneath the surface, where it pressed out to form large domes.

Lava continued to work its way to the surface throughout the area, building other, smaller volcanic domes. Some areas then collapsed, creating the irregular depressions observed by LRO's camera, researchers said.

The research is detailed in the July 24 edition of the journal Nature Geoscience.

Rare volcanoes on the moon

Most volcanoes, on Earth and off, are near other volcanoes. But the grouping in the Compton-Belkovich region is isolated.

"This small volcanic complex occurs far away from the part of the moon where most of the volcanic activity was concentrated, and where other silicic volcanism occurred," Jolliff said. "That's a puzzle."

Older, defunct volcanoes are not themselves uncommon. Scientists have known for years that volcanoes on the moon filled in craters to form the dark maria visible from Earth's surface. However, those lava flows are basaltic in nature.

The team also used the Diviner Lunar Radiometer Experiment to confirm the type of rocks on the plain.

"Very few minerals have an infrared spectrum that can explain Diviner's observations of Compton-Belkovich and the other nonbasaltic volcanoes on the moon," study co-author Timothy Glotch of Stony Brook University told SPACE.com via email. In fact, the rocks were silicate-rich.

"We've known for awhile that the Compton-Belkovich had an unusually high thorium content," Glotch said. "Now we can positively say that that thorium is related to these silicic volcano materials."

Volcanoes on the moon

Last fall, Glotch, working with another team, was the first to identify nonbasaltic volcanoes on the near side of the moon. Due to their highly reflective surface, this group was also originally noticed by the Lunar Prospector.

However, lava from the surrounding maria may have also concealed details of the volcanoes, so some details of the region's geologic history could have been hidden, researchers said. But the volcanoes on the far side have no maria nearby to hide their features. The complete view of the volcanism in the area lies open to examination.

Similarly, they are surprisingly free from impact craters, which reveals a great deal about their age, researchers added.

The early life of the solar system was violent, with rocks scarring the surface of the planets and their moons. Features that lack this scarring formed after things had calmed down.

Jolliff and his team estimated the age of the moon's rare far side silicate volcanoes to be about 800 million years old. Such an age would extend the volcanic activity of the moon by 200 million years, they said.

According to Glotch, the discovery of nonbasaltic volcanoes on the far side of the moon "shows that the moon is more compositionally diverse than we realized before this new age of lunar exploration."

"As scientists, we're still digesting all this relatively new data and working to understand what it means in terms of lunar history."

http://www.newscientist.com/article/dn20732-electric-dolphins-cetaceans-with-a-seventh-sense.html

Electric dolphins: cetaceans with a seventh sense

00:01 27 July 2011 by Rowan Hooper

One extra sense isn't quite enough for Guiana dolphins. In addition to echolocation, they can sense the electric fields of their prey – the first time this has been seen in true mammals.

Wolf Hanke at the University of Rostock in Germany and colleagues were intrigued by thermal images showing intense physiological activity in the pits on the upper jaw of the dolphins, Sotalia guianensis. Fish, some amphibians and primitive egg-laying mammals such as the duck-billed platypus use similar pits to pick up electric fields generated by nearby animals.

By examining the structures in a dead dolphin, and training a live one to respond to an electric field comparable to that generated by a fish, the team showed that dolphins also have electro-sensory perception.

"Electroreception is good for sensing prey over short distances, where echolocation isn't so effective," says Hanke. Other species of dolphin, and even whales, may be similarly gifted, he says. "Most people don't realise that whales also feed on the floor of the ocean, so it is possible that they also use electrosensing."

Hanke points out that the electro-sensory organs are derived from whiskers in ancestral animals. These mechanoreceptor organs, like the hair cells in the human ear, mechanically transmit the stimulus of touch or sound waves. The adaptation in Guiana dolphins is fairly new, Hanke says, and he suspects that "it is relatively easy to evolve, to change mechanoreceptor organs into electroreceptors".

Indeed, the finding suggests nearly all mammals have at least the potential to evolve it too.

Journal reference: Proceedings of the Royal Society B, DOI: 10.1098/rspb.2011.1127

http://www.newscientist.com/article/mg21128234.400-archaeopteryx-knocked-off-its-perch-as-first-bird.html

Archaeopteryx knocked off its perch as first bird

27 July 2011 by James O'Donoghue

FOR 150 years Archaeopteryx has been iconic as the earliest bird. The fossil sports feathered wings but a dinosaur's teeth and tail. Now the discovery of a feathered dinosaur in China has prompted a reassessment that has left Archaeopteryx squarely in dinosaur territory.

The diminutive new fossil, Xiaotingia zhengi, recently acquired by the Shandong Tianyu Museum of Nature from a fossil dealer, was excavated from 160-million-year-old rocks in Liaoning province (see the fossil here). It shares several key anatomical features with Archaeopteryx, including a "killing claw" on its second toe, and long and robust arms that probably allowed it to glide.

However, a team led by Xing Xu at the Institute of Vertebrate Paleontology and Paleoanthropology in Beijing deemed it sufficiently distinct from birds to be classified as a theropod dinosaur known as a deinonychosaur - and because of the similarities with Archaeopteryx, Xu's team concluded that the "first bird" is a deinonychosaur too (Nature, DOI: 10.1038/nature10288).

"We used to think Archaeopteryx was so different from other dinosaurs that it was ancestral to birds, but recent discoveries show that this is no longer the case," says Xu. "Our main conclusion is that Archaeopteryx is no longer a bird."

Other palaeontologists give Xu's findings a cautious welcome. "I am not surprised," says Gareth Dyke of University College Dublin in Ireland. "Flight may have evolved many times among small bodied theropod dinosaurs."

Causing a headache for taxonomists everywhere **(Image: Xing Lida and Liu Yi)**

If Xu's analysis holds up it will create quite a headache for taxonomists as Archaeopteryx is used to define the base of the birds. One solution would be to include deinonychosaurs in the birds, says Luis Chiappe of the Natural History Museum of Los Angeles County, California.

http://www.eurekalert.org/pub_releases/2011-07/uob-rpd072211.php

Rainforest plant developed sonar dish to attract pollinating bats

The researchers discovered that a rainforest vine, pollinated by bats, has evolved dish-shaped leaves with such conspicuous echoes that nectar-feeding bats can find its flowers twice as fast by echolocation.

While it is well known that the bright colours of flowers serve to attract visually-guided pollinators such as bees and birds, little research has been done to see whether plants which rely on echolocating bats for pollination and seed dispersal have evolved analogous echo-acoustic signals. The study is published today in Science.

The Cuban rainforest vine Marcgravia evenia has developed a distinctively shaped concave leaf next to its flowers which, the researchers noticed, is reminiscent of a dish reflector. By analyzing the leaf's acoustic reflection properties, they found that it acts as an ideal echo beacon, sending back strong, multidirectional echoes with an easily recognizable, and unvarying acoustic signature – perfect for making the flower obvious to echolocating bats.

They then trained nectar-feeding bats (Glossophaga soricina) to search for a single small feeder hidden within an artificial foliage background, varying the feeder's position and measuring the time the bats took to find it. The feeder was presented on its own or with a replica of either a foliage leaf or the distinctive dish-shaped leaf. Each feeder type was randomly tested once at each of the 64 positions within the artificial foliage background.

Search times were longest for all bats when the feeder was presented on its own and were slightly, but not significantly, shorter when a replica of a foliage leaf was added. However, a dish-shaped leaf replica above the feeder always reduced search times – by around 50 per cent.

Although the leaf's unusual shape and orientation reduce its photosynthetic yield compared to a similarly sized foliage leaf, the researchers argue that these costs are outweighed by the benefits of more efficient pollinator attraction.

Dr Marc Holderied of Bristol's School of Biological Sciences, co-author of the paper, said: "This echo beacon has benefits for both the plant and the bats. On one hand, it increases the foraging efficiency of nectar-feeding bats, which is of particular importance as they have to pay hundreds of visits to flowers each night to fulfill their energy needs. On the other hand, the M. evenia vine occurs in such low abundance that it requires highly mobile pollinators."

Bats, with their wide home range and excellent spatial memory, are exceptionally efficient pollinators and many other neotropical plants depend on them for pollination. As the acoustic and perceptual principles shaping the echo beacon leaf of Marcgravia evenia should work for all echolocating pollinators, the researchers expect to find other instances of plant species that use acoustic signalling to attract their bat pollinators.

Paper *'Floral acoustics: conspicuous echoes of a dish-shaped leaf attract bat pollinators' by Ralph Simon, Marc W. Holderied, Corinna U. Koch and Otto von Helversen in Science*

http://www.eurekalert.org/pub_releases/2011-07/aha-tbi072211.php

Traumatic brain injury linked with tenfold increase in stroke risk

If you suffer traumatic brain injury, your risk of having a stroke within three months may increase tenfold, according to a new study reported in Stroke: Journal of the American Heart Association.

"It's reasonable to assume that cerebrovascular damage in the head caused by a traumatic brain injury can trigger either a hemorrhagic stroke [when a blood vessel bursts inside the brain] or an ischemic stroke [when an artery in the brain is blocked]," said Herng-Ching Lin, Ph.D., senior study author and professor at the School of Health Care Administration, College of Medicine, Taipei Medical University in Taiwan. "However, until now, no research had been done showing a correlation between traumatic brain injury and stroke."

It is the first study that pinpoints traumatic brain injury as a potential risk factor for subsequent stroke.

Traumatic brain injury occurs when an external force such as a bump, blow or jolt to the head disrupts the normal function of the brain. Causes include falls, vehicle accidents, and violence.

In the United States alone, approximately 1 in 53 individuals sustain a traumatic brain injury each year, according to 2004 statistics from the Centers for Disease Control and Prevention.

Worldwide, traumatic brain injuries are a major cause of physical impairment, social disruption and death.

Using records from a nationwide Taiwanese database, researchers investigated the risk of stroke in traumatic brain injury patients during a five-year period. The records included 23,199 adult traumatic brain injury patients who received ambulatory or hospital care between 2001 and 2003. The comparison group comprised 69,597 non-traumatic brain injury patients. The average age of all patients was 42 and 54 percent were male.

During the three months after injury, 2.91 percent of traumatic brain injury patients suffered a stroke compared with only 0.30 percent of those with non-traumatic brain injury — a tenfold difference.

Stroke risk in patients with traumatic brain injury decreased gradually over time, researchers said:

After one year, the risk was about 4.6 times greater for patients who suffered a traumatic brain injury than for those who had not.

After five years, the risk was 2.3 times greater for traumatic brain injury patients.

Stroke risk among traumatic brain injury patients with skull bone fractures was more pronounced than in traumatic brain injury patients without fractures, researchers said.

During the first three months, those with skull bone fractures were 20 times more likely to have a stroke than patients without skull bone fractures. The risk decreased over time.

Furthermore, the risk of subarachnoid hemorrhage (bleeding in the area between the brain and the thin tissues that cover the brain) and intracerebral hemorrhage (bleeding in the brain caused by the rupture of a blood vessel) increased significantly in patients with traumatic brain injury versus non-traumatic brain injury patients.

After considering age and gender, patients with traumatic brain injury were more likely to have hypertension, diabetes, coronary heart disease, atrial fibrillation and heart failure than non-traumatic brain injury patients.

Early neuroimaging examinations — such as MRI — and intensive medical monitoring, support and intervention should be required following a traumatic brain injury, especially during the first few months and years, Lin said. Moreover, better health education initiatives could increase public awareness about the factors that cause strokes and the signs and symptoms of stroke in patients with traumatic brain injuries.

"Stroke is the most serious and disabling neurological disorder worldwide," said Lin. "Our study leads the way in identifying stroke as an additional neurological problem that may arise following traumatic brain injury."

Co-authors are: Yi-Hua-Chen, Ph.D, lead author and Jiunn-Horng Kang, M.D.

http://medicalxpress.com/news/2011-07-livestock-farm-linked-blood-cancers.html

Growing up on livestock farm linked to increased risk of blood cancers

Growing up on a livestock farm seems to be linked to an increased risk of developing blood cancers as an adult, indicates research published online in Occupational and Environmental Medicine.

The risk of developing a blood cancer was three times as high for those who had grown up on a poultry farm, the study shows.

Previous research has suggested that farmers are at increased risk of blood cancers, the possible explanations for which have focused on exposure to pesticides or infections as a result of contact with farm animals. But most of this research has focused on adults, say the authors, with little information on potential early life factors.

The authors base their findings on an analysis of more than 114,000 death certification records from 1998 to 2003 for those aged between 35 and 85 and resident in New Zealand.

Information regarding the deceased's usual job and that of at least one of the parents was extracted for 82% (94,054) of the records.

During the study period, just over 3,000 deaths were attributed to blood cancers, and growing up on a livestock farm was associated with a higher risk of developing such a cancer.

This association was not apparent for those who had grown up on arable/crop farms, although working on one of these farms as an adult was associated with a higher risk.

The analysis showed that the overall risk of developing a blood cancer, such as leukaemia, multiple myeloma, and non-Hodgkin's lymphoma, was 22% higher for those growing up on livestock farm compared with those who had not grown up in this environment.

Poultry farms conferred the greatest risk, with those who had grown up in this environment three times as likely to develop a blood cancer as those who had not.

Growing up on an arable/crop farm conferred an almost 20% lower risk of developing a blood cancer, but crop farming as an adult was associated with an almost 50% increased risk.

Working on a livestock farm as an adult also seemed to lessen the risk by 20%— with the exception of beef cattle farming, where the risk was three times as high.

These findings held true, even after taking account of factors likely to influence the results and after comparison with different causes of death.

The authors caution that further studies will be needed before a definitive cause and effect can be established, but they say that their study "suggests that farming exposures in adulthood and childhood play independent roles in the development of haematological cancers."

They go on to say that exposure to particular types of virus in childhood may alter the immune system response, so increasing the risk of blood cancer in later life. *Provided by British Medical Journal*