

<http://www.sciencedaily.com/releases/2013/05/130506095253.htm>

Endogenous Antibiotic Discovered in the Brain

Scientists have discovered that immune cells in the brain can produce a substance that prevents bacterial growth

Scientists from the Luxembourg Centre for Systems Biomedicine (LCSB) of the University of Luxembourg have discovered that immune cells in the brain can produce a substance that prevents bacterial growth: namely itaconic acid. Until now, biologists had assumed that only certain fungi produced itaconic acid. A team working with Dr. Karsten Hiller, head of the Metabolomics Group at LCSB, and Dr. Alessandro Michelucci has now shown that even so-called microglial cells in mammals are also capable of producing this acid. "This is a ground breaking result," says Prof. Dr. Rudi Balling, director of LCSB: "It is the first proof of an endogenous antibiotic in the brain."

The researchers have now published their results in the scientific journal PNAS.

Alessandro Michelucci is a cellular biologist, with focus on neurosciences. This is an ideal combination for LCSB with its focus on neurodegenerative diseases, and Parkinson's disease especially -- i.e. changes in the cells of the human nervous system. "Little is still known about the immune responses of the brain," says Michelucci. "However, because we suspect there are connections between the immune system and Parkinson's disease, we want to find out what happens in the brain when we trigger an immune response there." For this purpose, Michelucci brought cell cultures of microglial cells, the immune cells in the brain, into contact with specific constituents of bacterial membranes. The microglial cells exhibited a response and produced a cocktail of metabolic products.

This cocktail was subsequently analysed by Karsten Hiller's metabolomics group. Upon closer examination, the scientists discovered that production of one substance in particular -- itaconic acid -- was upregulated. "Itaconic acid plays a central role in the plastics production. Industrial bioreactors use fungi to mass-produce it," says Hiller: "The realisation that mammalian cells synthesise itaconic acid came as a major surprise."

However, it was not known how mammalian cells can synthesise this compound. Through sequence comparisons of the fungi's enzyme sequence to human protein sequences, Karsten Hiller then identified a human gene, which encodes a protein similar to the one in fungi: immunoresponsive gene 1, or IRG1 for short -- a most exciting discovery as the function of this gene was not known. Says Hiller: "When it comes to IRG1, there is a lot of uncharted territory. What we did know is that it seems to play some role in the big picture of the immune response, but what exactly that role was, we were not sure."

To change this situation, the team turned off IRG1 in cell cultures and instead added the gene to cells that normally do not express it. The experiments confirmed that in mammals, IRG1 codes for an itaconic acid-producing enzyme. But why? When immune cells like macrophages and microglial cells take up bacteria in order to inactivate them, the intruders are actually able to survive by using a special metabolic pathway called the glyoxylate shunt. According to Hiller, "macrophages produce itaconic acid in an effort to foil this bacterial survival strategy."

The acid blocks the first enzyme in the glyoxylate pathway. Which is how macrophages partially inhibit growth in order to support the innate immune response and digest the bacteria they have taken up." LCSB director Prof. Dr. Rudi Balling describes the possibilities that these insights offer: "Parkinson's disease is highly complex and has many causes. We now intend to study the importance of infections of the nervous system in this respect -- and whether itaconic acid can play a role in diagnosing and treating Parkinson's disease."

A. Michelucci, T. Cordes, J. Ghelfi, A. Pailot, N. Reiling, O. Goldmann, T. Binz, A. Wegner, A. Tallam, A. Rausell, M. Buttini, C. L. Linster, E. Medina, R. Balling, K. Hiller. *Immune-responsive gene 1 protein links metabolism to immunity by catalyzing itaconic acid production. Proceedings of the National Academy of Sciences, 2013; DOI: 10.1073/pnas.1218599110*

<http://nyti.ms/137L2qc>

Visitors From Outer Space, Real or Not, Are Focus of Discussion in Washington

Six former members of Congress gathered to consider what they see as the enforced government secrecy surrounding extraterrestrials

By ANDREW SIDONS

WASHINGTON - While President Obama was promoting an immigration overhaul in Mexico, six former members of Congress gathered two blocks from the White House to consider what they see as the enforced government secrecy surrounding another kind of visitor: the kind who come from a lot farther away. Every day this week, the former legislators presided over panels made up of academics and - former, of course - government and military officials, who were there to discuss their research or their own eyewitness accounts of unidentified flying objects and the extraterrestrials who presumably would have occupied them.

“Something is monitoring the planet, and they are monitoring it very cautiously, because we are a very warlike planet,” said Mike Gravel, a former Democratic senator from Alaska who ran in both the Democratic and Libertarian presidential primaries in 2008.

Mr. Gravel and his fellow panelists were assembled by the Paradigm Research Group, which says it is committed to ending the government’s “truth embargo” on the existence of extraterrestrial life. The lawmakers were there in hopes that their presence and political credibility would be enough to persuade Congress to take the issue seriously.

“I’ve been exploring how we might get this issue out of the shadows of the lunatic fringe,” said Roscoe G. Bartlett, a former Republican representative from Maryland. Before his defeat last year, Mr. Bartlett was known for sounding the alarm on the threat posed to the nation’s energy infrastructure by electromagnetic pulse, or EMP, the shock wave from a nuclear weapon detonated beyond the earth’s atmosphere.

Called the Citizen Hearing on Disclosure, the event might have been mistaken as advocacy for government transparency, and some of the panelists had impressive résumés.

“I’ve come to understand and appreciate the importance of open, transparent government and the power of truth,” said Paul T. Hellyer, who served as Canadian minister of defense during the 1960s. “We are not alone in the cosmos,” he added.

One reason the ex-members of Congress agreed to sit on the dais and ask questions may have been curiosity.

“Our country has trivialized it, has made it a joke, has made it green people with horns sticking out,” said Carolyn Kilpatrick, a Democratic representative from Michigan who lost her seat in 2010.

“Now I find that it’s much more than that. And it’s not a joke. And there is scientific data that there may be something there.”

Another reason might have been the \$20,000 the organizers said they paid each panelist. But they are still maintaining a healthy skepticism.

“Just because the government might have had a document about how to handle extraterrestrials doesn’t mean there were any,” said Merrill Cook, a Republican from Utah who was twice elected to the House.

The panels this week have been low-hanging fruit for the news media while President Obama is out of town and Congress is out of session, and not all of the people who study U.F.O.’s think the meetings will help them improve their stature in Washington.

“There really is something to this issue, and there is a serious side to it, but that’s not what’s being presented at this event,” said Leslie Kean, a journalist and author of “U.F.O.’s: Generals, Pilots and Government Officials Go on the Record,” a collection of firsthand accounts by people who believe they saw them.

The conclusion that U.F.O.’s are proof of extraterrestrial life is misguided, she said, and the people who broadcast that belief hindered support for real scientific research.

Despite the ridicule that usually accompanies the discussion of U.F.O.’s, they have been quietly talked about in corridors of power here. Some panelists at the event this week counted among true believers John D. Podesta, a chief of staff in President Bill Clinton’s White House, because of his role in Executive Order 12958, which requires the declassification of most government documents over 25 years old.

But the possible existence of extraterrestrial life is not exactly why he believes in government transparency, Mr. Podesta said.

“At the end of the day, there are going to be people who say that even if you did that, there must be other files that exist that you’re not disclosing,” he said in an interview.

But objects in the sky have piqued his interest. In June 2011, the Center for American Progress hosted government officials, from the Pentagon, NASA and the Department of Transportation, as well as Congressional staff and former officials from intelligence organizations, for a briefing by Ms. Kean and experts from academia and foreign militaries.

The private briefing was organized to discuss a proposal that the government establish a small office of two staff members who would selectively investigate mysterious skyward sightings and seek to understand them by applying scientific method.

The proposal did not refer to U.F.O.’s, but rather, U.A.P.’s, unidentified aerial phenomena, as if those who drew up the proposal were keenly aware of how their objective could be perceived.

“They were interesting, credible people who had observed aerial phenomena that were unexplained and worthy of additional follow-up,” Mr. Podesta said. “Going back and looking at and declassifying whatever government documents exist is a smart thing to do.”

http://www.eurekalert.org/pub_releases/2013-05/aaop-frm042613.php

Flame retardants may be toxic to children

Lower intelligence, hyperactivity seen in children whose mothers were exposed to the chemicals during pregnancy

WASHINGTON, DC – Chemicals called polybrominated diphenyl ethers (PBDEs) have been used for decades to reduce fires in everyday products such as baby strollers, carpeting and electronics. A new study to be presented on Monday, May 6, at the Pediatric Academic Societies (PAS) annual meeting shows that prenatal exposure to the flame retardants is associated with lower intelligence and hyperactivity in early childhood.

"In animal studies, PBDEs can disrupt thyroid hormone and cause hyperactivity and learning problems," said lead author Aimin Chen, MD, PhD, assistant professor in the Department of Environmental Health at University of Cincinnati College of Medicine. "Our study adds to several other human studies to highlight the need to reduce exposure to PBDEs in pregnant women."

Dr. Chen and his colleagues collected blood samples from 309 pregnant women enrolled in a study at Cincinnati Children's Hospital Medical Center to measure PBDE levels. They also performed intelligence and behavior tests on the women's children annually until they were 5 years old.

"We found maternal exposure to PBDEs, a group of brominated flame retardants mostly withdrawn from the U.S. market in 2004, was associated with deficits in child cognition at age 5 years and hyperactivity at ages 2-5 years," Dr. Chen said. A 10-fold increase in maternal PBDEs was associated with about a 4 point IQ deficit in 5-year-old children.

Even though PBDEs, except Deca-BDEs, are not used as a flame retardant in the United States anymore, they are found on many consumer products bought several years ago. In addition, the chemicals are not easily biodegradable, so they remain in human tissues and are transferred to the developing fetus.

"Because PBDEs exist in the home and office environment as they are contained in old furniture, carpet pads, foams and electronics, the study raises further concern about their toxicity in developing children," Dr. Chen concluded.

To view the abstract, "Cognitive Deficits and Behavior Problems in Children with Prenatal PBDE Exposure," go to http://www.abstracts2view.com/pas/view.php?nu=PAS13LI_3550.8.

<http://phys.org/news/2013-05-universe-evolve-black-holes.html>

Did the universe evolve to make black holes?

The maths underpinning Darwin's theory of natural selection could explain how the universe may be 'designed' to make black holes.

Phys.org - New Oxford University research builds on the 'cosmological natural selection hypothesis' – an idea first put forward in the 1990s to explain the apparent 'fine-tuning' of the universe's basic parameters to allow for the existence of atoms, galaxies, and life itself.

Cosmological natural selection proposes that, if new universes are born inside black holes, a 'multiverse' of many possible universes could be shaped by a process similar to natural selection so that successive generations of universes evolve to become better at making black holes.

The Oxford team of evolutionary theorist Andy Gardner and theoretical physicist Joseph Conlon found that a basic equation from evolutionary genetics – called Price's theorem – can capture the process of cosmological natural selection and explain how the universe seems designed for the purpose of making black holes rather like a fish can seem 'designed' to swim underwater or a bird can appear 'designed' to fly.

A report of the research is published in the journal *Complexity* online.

'This idea of cosmological natural selection is controversial, and physicists have pointed out all sorts of problems with it. But we were interested in seeing if its basic evolutionary logic actually works,' said Dr Andy Gardner of Oxford University's Department of Zoology, lead author of the paper.

'We found that a general equation from evolutionary genetics, Price's theorem, can help us to model how selection can work not only at the scale of genes and organisms but also at that of something as unimaginably vast as multiple universes,' said Dr Gardner. 'Our model uses maths similar to the mathematical theory underlying Darwinian adaptation in biology, which explains how the dynamics of natural selection leads to organisms appearing designed to maximize their fitness.'

The researchers point out that the evolution of universes is in many ways very different from the evolution of animals. For a start, in a multiverse of many possible universes there is no real concept of change over time. However, their models of evolving universes are quite similar to models of bacterial evolution – where generations evolve out of the asexual budding of cells.

More information: *Complexity* paper: www.zoo.ox.ac.uk/group/gardner/publications/GardnerConlon_2013.pdf

<http://phys.org/news/2013-05-russian-evidence-notion-lightning-cosmic.html>

Russian researchers find more evidence to support notion that lightning is caused by cosmic rays

Russian physicists Alex Gurevich and Anatoly Karashtin claim, in a paper published in the journal Physical Review Letters, they have found more evidence to support their idea that lightning is caused by cosmic rays.

Phys.org - The notion was first proposed by Gurevich back in 1992, and has been a source of debate ever since. No one really knows what causes lightning to form and strike - the prevailing view is that it comes about as a result of collisions between ice crystals in clouds and hail stones. But because clouds and the lightning they produce are unpredictable and hard to pin down, no one has been able to prove this theory. Another theory, proposed by Gurevich twenty years ago, says that lightning is formed from the collisions between cosmic rays and water droplets present in thunderclouds. Now he and a colleague claim to have found evidence to support this idea.

Gurevich suggests that cosmic rays entering thunder clouds cause the air in them to be ionized, resulting in a lot of free electrons floating around. The electric field already present in the cloud, he continues, leads to the free electrons being boosted to higher energies. When the electrons present in the air collide with water atoms, more electrons are released, setting off what he describes as an avalanche of high-energy particles that eventually give way to a "runaway breakdown" - a discharge that is witnessed as a lightning strike.

As with other theories regarding the origins of lightning, Gurevich's ideas haven't been proved. But he hasn't been sitting still. In this new effort, he along with Karashtin have been measuring and analyzing radio waves in storm clouds as lightning occurs. The idea is that if such strikes are due to interactions with cosmic rays, there should be measurable amounts of radio waves given off.

Gurevich and Karashtin set up equipment to monitor storm clouds over Russia and Kazakhstan - recording radio waves emitted during 3,800 lightning strikes. In analyzing the data, they found that hundreds, and perhaps even thousands of short radio wave pulses occurred just as a bolt of lightning was about to form. Perhaps more importantly, they matched the models Gurevich had built years before. There was one hitch however, the amount of energy delivered by the cosmic rays in the model don't happen often enough in the real world to cause lightning strikes in most every thunderstorm.

Gurevich and Karashtin say the discrepancy can be explained by the addition of energy into the system by free electrons passing near hydrometeors (bits of hail or water droplets). When that happens, very small discharges result, adding to the total charge. Taken together they say, enough energy is added to cause the cascade that leads to lightning formation.

More information: Runaway Breakdown and Hydrometeors in Lightning Initiation, Phys. Rev. Lett. 110, 185005 (2013). prl.aps.org/abstract/PRL/v110/i18/e185005

Abstract

The particular electric pulse discharges are observed in thunderclouds during the initiation stage of negative cloud-to-ground lightning. The discharges are quite different from conventional streamers or leaders. A detailed analysis reveals that the shape of the pulses is determined by the runaway breakdown of air in the thundercloud electric field initiated by extensive atmospheric showers (RB-EAS). The high amplitude of the pulse electric current is due to the multiple microdischarges at hydrometeors stimulated and synchronized by the low-energy electrons generated in the RB-EAS process. The series of specific pulse discharges leads to charge reset from hydrometeors to the free ions and creates numerous stretched ion clusters, both positive and negative. As a result, a wide region in the thundercloud with a sufficiently high fractal ion conductivity is formed. The charge transport by ions plays a decisive role in the lightning leader preconditioning.

http://www.eurekalert.org/pub_releases/2013-05/uons-nef050413.php

No evidence for theory humans wiped out megafauna

Most species of gigantic animals that once roamed Australia had disappeared by the time people arrived, a major review of the available evidence has concluded.

Sydney, Australia: The research challenges the claim that humans were primarily responsible for the demise of the megafauna in a proposed "extinction window" between 40,000 and 50,000 years ago, and points the finger instead at climate change. An international team led by the University of New South Wales, and including researchers at the University of Queensland, the University of New England, and the University of Washington, carried out the study. It is published in the Proceedings of the National Academy of Sciences.

"The interpretation that humans drove the extinction rests on assumptions that increasingly have been shown to be incorrect. Humans may have played some role in the loss of those species that were still surviving when people arrived about 45,000 to 50,000 years ago - but this also needs to be demonstrated," said Associate Professor Stephen Wroe, from UNSW, the lead author of the study.

"There has never been any direct evidence of humans preying on extinct megafauna in Sahul, or even of a tool-kit that was appropriate for big-game hunting," he said.

About 90 giant animal species once inhabited the continent of Sahul, which included mainland Australia, New Guinea and Tasmania.

"These leviathans included the largest marsupial that ever lived – the rhinoceros-sized Diprotodon – and short-faced kangaroos so big we can't even be sure they could hop. Preying on them were goannas the size of large saltwater crocodiles with toxic saliva and bizarre but deadly marsupial lions with flick-blades on their thumbs and bolt cutters for teeth," said Associate Professor Wroe.



This is an artist's reconstruction of an extinct marsupial lion -- Thylacoleo carnifex. Credit: Artwork: Peter Schouten

The review concludes there is only firm evidence for about 8 to 14 megafauna species still existing when Aboriginal people arrived. About 50 species, for example, are absent from the fossil record of the past 130,000 years. Recent studies of Antarctic ice cores, ancient lake levels in central Australia, and other environmental indicators also suggest Sahul - which was at times characterised by a vast desert - experienced an increasingly arid and erratic climate during the past 450,000 years.

Arguments that humans were to blame have also focused on the traditional Aboriginal practice of burning the landscape. But recent research suggests that the fire history of the continent was more closely linked to climate than human activity, and increases in burning occurred long before people arrived.

"It is now increasingly clear that the disappearance of the megafauna of Sahul took place over tens, if not hundreds, of millennia under the influence of inexorable, albeit erratic, climatic deterioration," said Associate Professor Wroe.

<http://www.wired.com/wiredscience/2013/05/ice-age-language/>

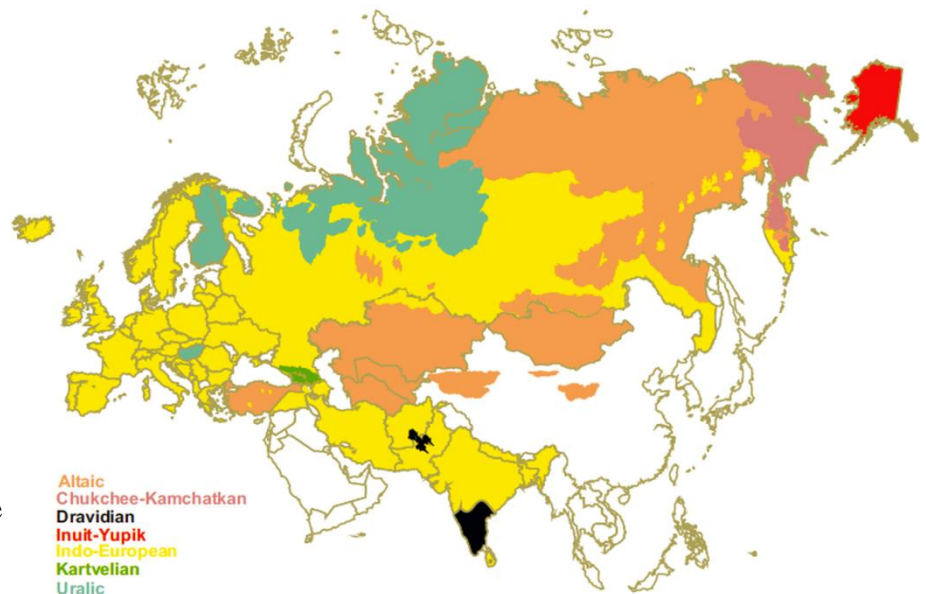
English May Have Retained Words From an Ice Age Language

Frequently used words can persist for generations, even millennia, and similar sounds and meanings often turn up in very different languages

By Elizabeth Norton, ScienceNOW

If you've ever cringed when your parents said "groovy," you'll know that spoken language can have a brief shelf life. But frequently used words can persist for generations, even millennia, and similar sounds and meanings often turn up in very different languages. The existence of these shared words, or cognates, has led some linguists to suggest that seemingly unrelated language families can be traced back to a common ancestor. Now, a new statistical approach suggests that peoples from Alaska to Europe may share a linguistic forebear dating as far back as the end of the Ice Age, about 15,000 years ago.

"Historical linguists study language evolution using cognates the way biologists use genes," explains Mark Pagel, an evolutionary theorist at the University of Reading in the United Kingdom. For example, although about 50% of French and English words derive from a common ancestor (like "mere" and "mother," for example), with English and German the rate is closer to 70% - indicating that while all three languages are related, English and German have a more recent common ancestor. In the same vein, while humans, chimpanzees, and gorillas have common genes, the fact that humans share almost 99% of their DNA with chimps suggests that these two primate lineages split apart more recently.



Map showing approximate regions where languages from the seven Eurasiatic language families are spoken. The color-shaded areas should be treated as suggestive only, as current language ranges will not necessarily correspond to original homelands, and language boundaries will often overlap. For example, the Indo-European language Swedish is spoken along with the Uralic Finnish in southern Finland (map source: refs. 10, 16 and 34) (SI Text).

Because words don't have DNA, researchers use cognates found in different languages today to reconstruct the ancestral "protowords." Historical linguists have observed that over time, the sounds of words tend to change in regular patterns. For example, the p sound frequently changes to f, and the t sound to th - suggesting that the Latin word pater is, well, the father of the English word father. Linguists use these known rules to work backward in time, making a best guess at how the protoword sounded. They also track the rate at which words change. Using these phylogenetic principles, some researchers have dated many common words as far back as 9000 years ago. The ancestral language known as Proto-Indo-European, for example, gave rise to languages including Hindi, Russian, French, English, and Gaelic.

Some researchers, including Pagel, believe that the world's languages are united by even older superfamilies, but this view is hotly contested. Skeptics feel that even if language families were related, words suffer from too much erosion, both in terms of sound and meaning, to be reliably traced back further than 9000 or 10,000 year, and that the similarities of many cognates may be pure chance. What was missing, Pagel says, was an objective method of analysis.

Pagel and his co-workers took a first step by building a statistical model based on Indo-European cognates. Incorporating only the frequency of a word's use and its part of speech (noun, verb, numeral, etc.) - and ignoring its sound - the model could predict how long the word persisted through time. Reporting in *Nature* in 2007, they found that most words have about a 50% chance of being replaced by a completely different word every 2000 to 4000 years. Thus the Proto-Indo-European wata, winding its way through wasser in German, water in English, and voda in Russian, became eau in French. But some words, including I, you, here, how, not, and two, are replaced only once every 10,000 or even 20,000 years.

The new study, appearing today in the *Proceedings of the National Academy of Sciences*, makes an even bolder statement. The researchers broadened the hunt to cognates from seven major language families, including Indo-European, Eskimo, Altaic (comprising many Oriental languages), and Chukchi-Kamchatkan (a group of non-Russian languages around Siberia), which have been proposed to form an ancient superfamily dubbed Eurasiatic. Again, using only the word's frequency and part of speech, the model successfully predicted that a core group of about 23 very common words, used about once per 1000 words in everyday speech, not only persists within each language group, but also sounds similar to the corresponding words in other families. The word thou, for example, has similar sound and meaning among all seven language families. Cognates include te or tu in Indo-European languages, t`i in proto-Altaic, and turi in proto-Chukchi-Kamchatkan. The words not, that, we, who, and give were cognates in five families, and nouns and verbs including mother, hand, fire, ashes, worm, hear, and pull, were shared by four. Going by the rate of change of these cognates, the model suggests that these words have remained in a similar form since about 14,500 years ago, thus supporting the existence of an ancient Eurasiatic language and its now far-flung descendants.

"The model hints at a group of people living somewhere in Southern Europe as the glaciers were receding, speaking a language that might resemble those spoken today," Pagel says. "It's astonishing that spoken language can be transmitted through millennia with enough fidelity to give us information about our early history."

Whether the findings will sway the skeptics is another question, according to William Croft, a linguist at the University of New Mexico, Albuquerque. The use of methods from evolutionary biology makes the Eurasiatic superfamily more plausible, says Croft, who is more sympathetic than many to the idea. "It probably won't convince most historical linguists to accept the Eurasiatic hypothesis, but their resistance may soften somewhat." *This story provided by ScienceNOW, the daily online news service of the journal Science.*

http://www.eurekalert.org/pub_releases/2013-05/jgum-tne050613.php

The nocebo effect: Media reports may trigger symptoms of a disease

Expectation of negative effects can increase likelihood of experiencing symptoms -- Media needs to be more responsible when warning about health risks

Media reports about substances that are supposedly hazardous to health may cause suggestible people to develop symptoms of a disease even though there is no objective reason for doing so. This is the conclusion of a study of the phenomenon known as electromagnetic hypersensitivity. Those affected report experiencing certain symptoms on exposure to electromagnetic waves, such as those emitted by cell phones, and these take the form of physical reactions. With the help of magnetic resonance imaging, it has been demonstrated that the regions of the brain responsible for pain processing are active in such cases. "Despite this, there is a considerable body of evidence that electromagnetic hypersensitivity might actually be the result of a so-called nocebo effect," explained Dr. Michael Witthöft of Johannes Gutenberg University Mainz (JGU). "The mere anticipation of possible injury may actually trigger pain or disorders. This is the opposite of the analgesic

effects we know can be associated with exposure to placebos." The new study illustrates how media reports about health risks may trigger or amplify nocebo effects in some people.

Frequently, the media reports on the potential health risks associated with the electromagnetic fields (EMFs) produced by cell phones, cell phone masts, high-voltage lines, and Wi-Fi devices. People who are sensitive to electromagnetic fields report symptoms such as headaches, dizziness, burning or tingling sensations on their skin, and they attribute these effects to this radiation. Some people actually skip work or withdraw from their social environment because of their electromagnetic hypersensitivity and in extreme cases they may even move to remote regions to get away from electrical equipment altogether. "However, tests have shown that the people affected are unable to tell if they have really been exposed to an electromagnetic field. In fact, their symptoms are triggered in exactly the same way if they are exposed to genuine and sham fields," added Witthöft. The so-called nocebo effect was initially identified during pharmaceutical trials. Subjects were observed to exhibit undesirable side effects even though they were not receiving the medication but merely a placebo.

Witthöft undertook the current study in collaboration with G. James Rubin during a research stay at King's College in London. The 147 test subjects were first shown a television report. One group of participants watched a BBC One documentary, which dealt in no uncertain terms with the potential health hazards supposedly associated with cell phone and WiFi signals. The other group watched a report on the security of Internet and cell phone data. Then all the subjects in both groups were exposed to fake WiFi signals that they were told were real. Even though they were not exposed to any radiation, some of the subjects developed characteristic symptoms: 54 percent of the subjects reported experiencing agitation and anxiety, loss of concentration or tingling in their fingers, arms, legs, and feet. Two participants left the study prematurely because their symptoms were so severe that they no longer wanted to be exposed to the assumed radiation. It became apparent that the symptoms were most severe among the subjects who had high pre-existing anxiety as a result of viewing the documentary about the possible hazards of electromagnetic radiation.

The study thus demonstrates that sensationalized media reports on potential risks, which often lack scientific evidence, can have a significant effect on the health of large sections of the population. Such speculation on health hazards most likely has more than just a short-term impact like that of a self-fulfilling prophesy; it is likely that over the long term some people begin to believe that they are sensitive and develop symptoms in certain situations when exposed to electrosmog. "Science and the media need to work together more closely and make sure that reports of possible health hazards from new technologies are as accurate as possible and are presented to the public using the best available scientific data," said Witthöft, drawing consequences from the study findings.

Michael Witthöft, G. James Rubin (2013), Are media warnings about the adverse health effects of modern life self-fulfilling? An experimental study on idiopathic environmental intolerance attributed to electromagnetic fields (IEI-EMF), Journal of Psychosomatic Research DOI:10.1016/j.jpsychores.2012.12.002

http://www.eurekalert.org/pub_releases/2013-05/pu-nas050613.php

New analysis suggests wind, not water, formed mound on Mars

Researchers suggest that Mars' roughly 3.5-mile high Mount Sharp most likely emerged as strong winds carried dust and sand into Gale Crater where the mound sits.

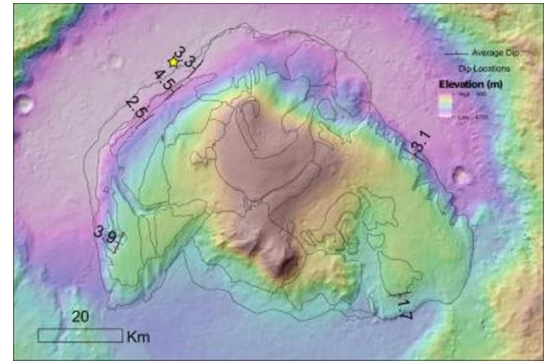
A roughly 3.5-mile high Martian mound that scientists suspect preserves evidence of a massive lake might actually have formed as a result of the Red Planet's famously dusty atmosphere, an analysis of the mound's features suggests. If correct, the research could dilute expectations that the mound holds evidence of a large body of water, which would have important implications for understanding Mars' past habitability.

Researchers based at Princeton University and the California Institute of Technology suggest that the mound, known as Mount Sharp, most likely emerged as strong winds carried dust and sand into the 96-mile-wide crater in which the mound sits. They report in the journal *Geology* that air likely rises out of the massive Gale Crater when the Martian surface warms during the day, then sweeps back down its steep walls at night. Though strong along the Gale Crater walls, these "slope winds" would have died down at the crater's center where the fine dust in the air settled and accumulated to eventually form Mount Sharp, which is close in size to Alaska's Mt. McKinley.

This dynamic counters the prevailing theory that Mount Sharp formed from layers of lakebed silt - and could mean that the mound contains less evidence of a past, Earth-like Martian climate than most scientists currently expect. Evidence that Gale Crater once contained a lake in part determined the landing site for the NASA Mars rover Curiosity. The rover touched down near Mount Sharp in August with the purpose of uncovering evidence of a habitable environment, and in December Curiosity found traces of clay, water molecules and organic compounds. Determining the origin of these elements and how they relate to Mount Sharp will be a focus for Curiosity in the coming months.

But the mound itself was likely never under water, though a body of water could have existed in the moat around the base of Mount Sharp, said study co-author Kevin Lewis, a Princeton associate research scholar in geosciences and a participating scientist on the Curiosity rover mission, Mars Science Laboratory. The quest to determine whether Mars could have at one time supported life might be better directed elsewhere, he said.

"Our work doesn't preclude the existence of lakes in Gale Crater, but suggests that the bulk of the material in Mount Sharp was deposited largely by the wind," said Lewis, who worked with first author Edwin Kite, a planetary science postdoctoral scholar at Caltech; Michael Lamb, an assistant professor of geology at Caltech; and Claire Newman and Mark Richardson of California-based research company Ashima Research.



Features of Mount Sharp are more consistent with wind deposition rather than an ancient lakebed, the researchers reported. Satellite images show that the various layers of sediment that make up Mount Sharp likely did not extend to the crater wall and also display a consistent tilt, or "dip," away from the center of the mound. The red dots denote dip areas with the average degree of slope indicated. The yellow star marks the landing site of the NASA Curiosity Mars rover. Image from Kevin Lewis

"Every day and night you have these strong winds that flow up and down the steep topographic slopes. It turns out that a mound like this would be a natural thing to form in a crater like Gale," Lewis said. "Contrary to our expectations, Mount Sharp could have essentially formed as a free-standing pile of sediment that never filled the crater."

Even if Mount Sharp were born of wind, it and similar mounds likely overflow with a valuable geological - if not biological - history of Mars that can help unravel the climate history of Mars and guide future missions, Lewis said.

"These sedimentary mounds could still record millions of years of Martian climate history," Lewis said. "This is how we learn about Earth's history, by finding the most complete sedimentary records we can and going through layer by layer. One way or another, we're going to get an incredible history book of all the events going on while that sediment was being deposited. I think Mount Sharp will still provide an incredible story to read. It just might not have been a lake."

Dawn Sumner, a geology professor at the University of California-Davis and a Mars Science Laboratory team member, said that the specificity of the researchers' model makes it a valuable attempt to explain Mount Sharp's origin. While the work alone is not yet enough to rethink the distribution of water on Mars, it does propose a unique wind dynamic for Gale Crater then models it in enough detail for the hypothesis to actually be tested as more samples are analyzed on Mars, Sumner said.

"To my knowledge, their model is novel both in terms of invoking katabatic [cool, downward-moving] winds to form Mount Sharp and in quantitatively modeling how the winds would do this," said Sumner, who is familiar with the work but had no role in it.

"The big contribution here is that they provide new ideas that are specific enough that we can start to test them," she said. "This paper provides a new model for Mount Sharp that makes specific predictions about the characteristics of the rocks within the mountain. Observations by Curiosity at the base of Mount Sharp can test the model by looking for evidence of wind deposition of sediment."

The researchers used pairs of satellite images of Gale Crater taken in preparation for the rover landing by the High-Resolution Imaging Science Experiment (HiRISE) camera onboard the Mars Reconnaissance Orbiter satellite managed by Caltech for NASA. Software tools extracted the topographical details of Mount Sharp and the surrounding terrain. The researchers found that the various layers in the mound did not form more-or-less flat-lying stacks as sediments deposited from a lake would. Instead, the layers fanned outward from the mound's center in an unusual radial pattern, Lewis said.

Kite developed a computer model to test how wind circulation patterns would affect the deposition and erosion of wind-blown sediment within a crater like Gale. The researchers found that slope winds that constantly exited and reentered Gale Crater could limit the deposition of sediments near the crater rim, while building up a mound in the center of the crater, even if the ground were bare from the start, Lewis said.

The researchers' results provide evidence for recent questions about Mount Sharp's watery origins, Lewis said. Satellite observations had previously detected water-related mineral signatures within the lower portion of Mount Sharp. While this suggested that the lower portion might have been series of lakebeds, portions of the upper mound were more ambiguous, Lewis said. First of all, the upper layers of the mound are higher than the

crater walls in several places. Also, Gale Crater sits on the edge of Mars' northern lowlands. If it had been filled with water to near the height of Mount Sharp then the entire northern hemisphere would have been flooded. Soil analyses carried out by Curiosity - the rover's primary mission is two years, but could be extended - will help determine the nature of Mount Sharp and the Martian climate in general, Lewis said. Wind erosion relies on specific factors such as the size of individual soil grains, so such information gleaned from the Curiosity mission will help determine Martian characteristics such as wind speed. On Earth, sediments need some amount of moisture to become cemented into rock. It will be interesting to know, Lewis said, how the rock layers of Mount Sharp are held together and how water might be involved.

"If the mechanism we describe is correct, it would tell us a lot about Mars and how it operates because Mount Sharp is only one of a class of enigmatic sedimentary mounds observed on Mars," Lewis said.

The paper, "Growth and form of the mound in Gale Crater, Mars: Slope wind enhanced erosion and transport," was published in the May 2013 issue of the journal Geology. The work was supported by grants from NASA, Caltech and the Princeton Department of Geosciences' Harry Hess fellowship.

http://www.eurekalert.org/pub_releases/2013-05/cumc-t1d050613.php

Type 1 diabetes and heart disease linked by inflammatory protein

Therapeutic agents that block the protein calprotectin could potentially reverse or slow the progression of atherosclerosis in people with type 1 diabetes

NEW YORK, NY - Type 1 (insulin-dependent) diabetes appears to increase the risk of heart disease, the leading cause of death among people with high blood sugar, partly by stimulating the production of calprotectin, a protein that sparks an inflammatory process that fuels the buildup of artery-clogging plaque. The findings, made in mice and confirmed with human data, suggest new therapeutic targets for reducing heart disease in people with type 1 diabetes. Led by Columbia University Medical Center (CUMC) researchers in collaboration with investigators at New York University and the University of Pittsburgh, the study was published today in the online edition of Cell Metabolism.

Diabetes is known to raise the risk for atherosclerosis, a disease in which fatty deposits known as plaque accumulate inside arteries. Over time, the arteries harden and narrow, leading to coronary artery disease and other forms of heart disease. Atherosclerosis is the leading cause of heart attacks, strokes, and peripheral vascular disease - collectively known as coronary heart disease, the leading cause of death in the United States. Scientists have known that diabetes leads to atherosclerosis. The study shows that this is associated with increased circulating levels of inflammatory white blood cells (WBCs), which contribute to the build-up of plaque. "But exactly how diabetes causes white blood cells to proliferate and lead to heart disease has been a mystery," said study co-leader Ira J. Goldberg, MD, Dickinson W. Richards Professor of Medicine at CUMC. In studies of mice with type 1 diabetes, Dr. Goldberg and his colleagues found that high blood sugar stimulates a type of inflammatory WBC known as neutrophils to release the protein calprotectin (also known as S100A8/9). The calprotectin travels to the bone marrow, where it binds to a cell-surface receptor called RAGE receptor, on common myeloid progenitor cells, which are involved in the production of various types of blood cells. This, in turn, leads to the proliferation of cells, known as granulocyte macrophage progenitor cells, which trigger the proliferation of even more neutrophils and of monocytes (another type of inflammatory WBC). Finally, these new WBCs enter the circulation and make their way to arterial plaques, fueling their progression. The researchers also found that normalizing the mice's blood glucose dampened this pathway, leading to an overall decrease in inflammation.

To determine the relevance of these findings in humans, the researchers analyzed data from 290 patients in the Pittsburgh Epidemiology of Diabetes Complications (EDC) Study, led by EDC Principal Investigator Trevor J. Orchard, who has been following people with diabetes for 18 years. Total WBC, neutrophil, and monocyte counts were all significantly associated with the development of coronary artery disease. The researchers also analyzed blood samples from a subgroup of EDC patients. Those who had developed coronary artery disease had significantly higher levels of calprotectin, compared with patients who had not developed coronary artery disease.

"The human data appear to fit with the animal data, in that both WBCs and calprotectin are associated with heart disease," said co-lead author Andrew J. Murphy, PhD, postdoctoral fellow in medicine at CUMC. The other lead author is Prabhakara R. Nagareddy, PhD, postdoctoral fellow at CUMC.

"Our findings point to the importance of controlling blood levels to limit the production of inflammatory cells that drive atherosclerosis; they also suggest novel therapeutic strategies, such as inhibiting the production of calprotectin or preventing its binding to the RAGE receptor," said study co-leader Alan R. Tall, MD, the Tilden Weger Bieler Professor of Medicine at CUMC.

The CUMC team is currently studying how type 2 diabetes increases one's risk for heart disease.

The paper is titled, "Hyperglycemia promotes myelopoiesis and impairs the resolution of atherosclerosis." The other contributors are Roslynn A. Stirzaker (CUMC), Yunying Hu (CUMC), Shiuqing Yu (CUMC), Rachel G. Miller (University of Pittsburgh, Pittsburgh, Penn.), Bhama Ramkhelawon New York University, New York, NY), Emilie Distel (NYU), Marit Westerterp (CUMC), Li-Shin Huang (CUMC), Ann Marie Schmidt (NYU), and Edward A. Fisher (NYU).

This research was supported by grants from the National Institutes of Health (U01-21 HL087945, DK095684 and DK048412; and P01 HL54591, and R01 HL107653, a Pilot and Feasibility Award from the Diabetes Complications Consortium, and postdoctoral fellowships from the Canadian Institutes of Health Research and the American Heart Association. A portion of funds supporting this research was obtained from Bristol-Myers Squibb Pharmaceuticals. The authors declare no other financial or conflicts of interest.

http://www.eurekalert.org/pub_releases/2013-05/uog-pws050713.php

Parents who suck on their infants' pacifiers may protect their children against developing allergy

Parental sucking on the baby's pacifier may give significant protection against allergy development

Swedish researchers at the Sahlgrenska Academy, University of Gothenburg, Sweden, report that a simple habit may give significant protection against allergy development, namely, the parental sucking on the baby's pacifier. Allergies are very common in industrialized countries. It has been suggested that exposure to harmless bacteria during infancy may be protective against the development of allergy. However, it has been difficult to pinpoint which bacteria a baby should be exposed to, and at what time and by which route this exposure should ideally occur.

Swedish researchers at the Sahlgrenska Academy, University of Gothenburg, now report that a simple habit may give significant protection against allergy development, namely, the parental sucking on the baby's pacifier. In a group of 184 children, who were followed from birth, the researchers registered how many infants used a pacifier in the first 6 months of life and how the parents cleaned the pacifier. Most parents rinsed the pacifier in tap water before giving it to the baby, e.g., after it had fallen on the floor. However, some parents also boiled the pacifier to clean it. Yet other parents had the habit of putting the baby's pacifier into their mouth and cleaning it by sucking, before returning it to the baby.

It was found that children whose parents habitually sucked the pacifier were three times less likely to suffer from eczema at 1.5 years of age, as compared with the children of parents who did not do this. When controlled for other factors that could affect the risk of developing allergy, such as allergy in the parents and delivery by Caesarean section, the beneficial effect of parental sucking on the pacifier remained.

Pacifier use per se had no effect on allergy development in the child. Boiling the pacifier also did not affect allergy development in a statistically proven fashion.

No more upper respiratory infections were seen in the children whose parents sucked on their dummies, as compared with the other children, as evidenced by diaries kept by the parents in which they noted significant events, such as infections.

Saliva is a very rich source of bacteria and viruses, and the researchers believe that oral commensal microbes are transferred from parent to infant when they suck on the same pacifier. When the composition of the bacterial flora in the mouth was compared between infants whose parents sucked on their pacifiers and those whose parent did not, it was found to differ, supporting this hypothesis.

According to "the hygiene hypothesis", the development of allergy can be attributed in part to a paucity of microbial stimulation during early infancy.

"Early establishment of a complex oral microflora might promote healthy maturation of the immune system, thereby counteracting allergy development", says professor Agnes Wold who led the study.

The study, which is published in the scientific journal *Pediatrics*, was performed by a team that consisted of paediatricians specialized in allergic diseases, as well as microbiologists and immunologists. The research team has previously conducted large-scale studies on the gut microbiota in relation to allergy development and showed in 2009 that a complex gut microbiota very early in life reduces the risk of allergy development.

<http://phys.org/news/2013-05-coumarin-cinnamon-cinnamon-based-products.html>

Study on coumarin in cinnamon and cinnamon-based products

Many foods, beverages and food supplements in the United States use a form of cinnamon that contains high levels of coumarin, which may cause liver damage in some sensitive people

Many kinds of cinnamon, cinnamon-flavored foods, beverages and food supplements in the United States use a form of the spice that contains high levels of a natural substance that may cause liver damage in some sensitive people, scientists are reporting. Their study, published in ACS' *Journal of Agricultural and Food Chemistry*, found similar results as those published in the European Union.

Ikhlas Khan and colleagues explain that cinnamon, which comes from the bark of certain trees, is one of the most important flavoring agents used in foods and beverages. "True," or Ceylon, cinnamon is expensive, so most breads, sticky buns and other products in the United States use dried cassia bark, or cassia cinnamon. Ceylon cinnamon contains very little coumarin, a naturally occurring substance that has been linked to liver damage in people sensitive to the substance. However, cassia cinnamon can contain larger amounts. Khan's team decided to check on the coumarin content of a wide variety of food products.

"As found in this study, coumarin was present, sometimes in substantial amounts, in cinnamon-based food supplements and cinnamon-flavored foods," they say.

More information: Study on coumarin in cinnamon and cinnamon-based products, Journal of Agricultural and Food Chemistry, 2013.

http://www.eurekalert.org/pub_releases/2013-05/jhm-sdt050713.php

Study demonstrates that once-a-day pill offers relief from ragweed allergy symptoms ***Once-daily tablet containing a high dose of a key ragweed pollen protein effectively blocks symptoms of ragweed allergy***

An international team of researchers, led by physician-scientists at Johns Hopkins, reports that a once-daily tablet containing a high dose of a key ragweed pollen protein effectively blocks the runny noses, sneezes, nasal congestion and itchy eyes experienced by ragweed allergy sufferers.

Tests showed that treatment with the pill, which contains the protein *Ambrosia artemisiifolia* major allergen 1, and is placed under the tongue to be absorbed, also reduced the need for anti-allergy drugs to get relief. More than 80 million Americans are allergic to ragweed.

The study is believed to be the first and largest, multicenter, double-blind, randomized controlled trial of its kind to investigate the use of sublingual immunotherapy against ragweed allergy. Begun in April 2010, it was funded by the drug's manufacturer, Merck of Whitehouse Station, N.J.

Results of the trial, published today in the *Journal of Allergy and Clinical Immunology*, showed that overall symptoms and need for such allergy medications as antihistamines and nasal steroids fell by 27 percent in people who took a pill containing 12 units of the allergen. During peak ragweed season, the roughly two-week period between August and October when pollen counts are highest, symptoms and medication use dropped 24 percent.

Researchers say that if the pill wins approval from the U.S. Food and Drug Administration, it could serve as a more convenient, less painful option than weekly or monthly allergy shots. The pill also presents fewer potential side effects than allergen injections.

"Our results show this oral tablet for ragweed allergy is highly effective and well-tolerated, and offers considerable relief from what many allergy sufferers consider the most agonizing part of the year," says allergist and lead study investigator Peter Creticos, M.D.

Some 784 men and women from the United States, Canada, Hungary, Russia and the Ukraine volunteered to take part in the year-long study, in which participants were randomly assigned to take either a high-, medium-, or low-dose tablet, or placebo. Neither researchers nor study participants were aware of which dose of the pill or placebo they were taking. Patients kept track of their symptoms and medication use through detailed and daily diaries, which were later scored by researchers for analysis.

"Physicians treating ragweed allergy sufferers may soon have an alternative to the current approach to managing ragweed allergy, which usually involves weekly or monthly visits to the doctor's office for allergy shots and carries the risk of swelling and pain at the injection site, plus risk of anaphylactic shock," says Creticos, an associate professor at the Johns Hopkins University School of Medicine.

Creticos says that no adverse events occurred during the study. The only side effects observed were mild throat irritation, itchy tongue and swollen lips.

Creticos says his team has also begun studies of other non-injectible forms of immunotherapy, including ragweed allergy drops, and treatment applications where the allergen is lightly pricked or inserted into the middle layers of the skin.

Other researchers involved in the study are Jennifer Maloney, M.D., Amarjot Kaur, Ph.D., Nancy Lui, Ph.D., and Hendrik Nolte, M.D., Ph.D., at Merck; David Bernstein, M.D., at the Bernstein Clinical Research Center and University of Cincinnati College of Medicine, in Ohio; Thomas Casale, M.D., at Creighton University in Omaha, Neb.; Robert Fisher, M.D., at Allergy Research and Care in Milwaukee, Wis.; Kevin Murphy at Boys Town National Research Hospital in Omaha, Neb.; and Kristof Nekam, M.D., at Hospital of the Hospitaller, Brothers of St. John of God, in Budapest, Hungary. During the conduct of the study, Creticos was a paid member of a Merck scientific advisory board.

http://www.eurekalert.org/pub_releases/2013-05/wuso-nsf050713.php

Nerve stimulation for severe depression changes brain function

For nearly a decade, doctors have used an implanted electronic stimulator to treat severe depression in people who don't respond to standard antidepressant therapy.

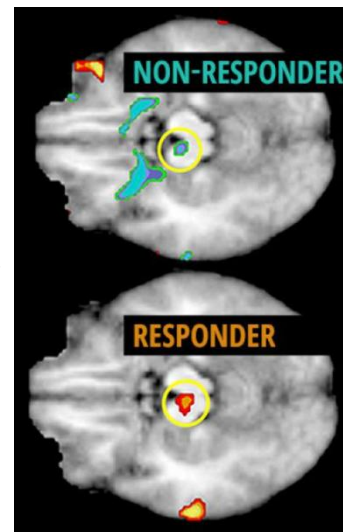
Now, preliminary brain scan studies conducted by researchers at Washington University School of Medicine in St. Louis are beginning to reveal the processes occurring in the brain during stimulation and may provide some clues about how the device improves depression. They found that vagus nerve stimulation brings about changes in brain metabolism weeks or even months before patients begin to feel better.

The findings will appear in an upcoming issue of the journal *Brain Stimulation* and are now available online.

"Previous studies involving large numbers of people have demonstrated that many with treatment-resistant depression improve with vagus nerve stimulation," says first author Charles R. Conway, MD, associate professor of psychiatry. "But little is known about how this stimulation works to relieve depression. We focused on specific brain regions known to be connected to depression."

Conway's team followed 13 people with treatment-resistant depression. Their symptoms had not improved after many months of treatment with as many as five different antidepressant medications. Most had been depressed for at least two years, but some patients had been clinically depressed for more than 20 years.

PET scans of patients successfully treated with vagus nerve stimulation show marked increases in cerebral glucose metabolism after 12 months of treatment (bottom image, red/orange area in yellow circle) in parts of the brainstem thought to be critical in depression. In nonresponders, glucose metabolism decreased in the same brain region (top image, blue/green area in yellow circle). Copyright Brain Stimulation 2013, with permission [Audio](#)



All of the participants had surgery to insert a device to electronically stimulate the left vagus nerve, which runs down the side of the body from the brainstem to the abdomen. Once activated, the device delivers a 30-second electronic stimulus to the vagus nerve every five minutes.

To establish the nature of the treatment's effects on brain activity, the researchers performed positron emission tomography (PET) brain imaging prior to the initiation of stimulation, and again three and 12 months after stimulation had begun.

Eventually, nine of the 13 subjects experienced improvements in depression with the treatment. However, in most cases it took several months for improvement to occur.

Remarkably, in those who responded, the scans showed significant changes in brain metabolism following three months of stimulation, which typically preceded improvements in symptoms of depression by several months.

"We saw very large changes in brain metabolism occurring far in advance of any improvement in mood," Conway says. "It's almost as if there's an adaptive process that occurs. First, the brain begins to function differently. Then, the patient's mood begins to improve."

Although the patients remained on antidepressants for several months after their stimulators were implanted, Conway says many of those who responded to the device eventually were able to stop taking medication.

"Sometimes the antidepressant drugs work in concert with the stimulator, but it appears to us that when people get better, it is the vagus nerve stimulator that is doing the heavy lifting," Conway explains. "Stimulation seems to be responsible for most of the improvement we see."

Additionally, the PET scans demonstrated that structures deeper in the brain also begin to change several months after nerve stimulation begins. Many of those structures have high concentrations of brain cells that release dopamine, a neurotransmitter that helps control the brain's reward and pleasure centers and also helps regulate emotional responses.

There is a consensus forming among depression researchers that problems in dopamine pathways may be particularly important in treatment-resistant depression, according to Conway. And he says the finding that vagus nerve stimulators influence those pathways may explain why the therapy can help and why, when it does work, its effects are not transient. Patients who respond to vagus nerve stimulation tend to get better and to stay better.

"We hypothesized that something significant had to be occurring in the brain, and our research seems to back that up," he says.

Funding for this research comes from the National Institute of Mental Health (NIMH) and the National Institute of Neurological Disorders and Stroke (NINDS) of the National Institutes of Health (NIH). Other funding was provided by a Young Investigator Award to Charles Conway from the National Alliance for Research in Schizophrenia and Affective Disorders

(NARSAD) and the Sidney R. Baer Jr. Foundation. Cyberonics, the maker of the vagus nerve stimulation device, donated three cost-free devices to subjects in this trial.

NIH grant numbers are 1K08MH078156-01A1, 9K24MH07951006 and P30NS048056.

Conway CR, Chibnall JT, Gebara MA, Price JL, Snyder AZ, Mintun MA, Craig AD, Cornell ME, Perantie DC, Giuffra LA, Buchholz RD, Sheline YI. Association of cerebral metabolic activity changes with vagus nerve stimulation antidepressant response in treatment-resistant depression. *Brain Stimulation*, published online Feb. 2013: doi: 10.1016/j.brs.2012.11.006

<http://bit.ly/17kXARM>

Guest Post: Honey bees, CCD, and the Elephant in the Room

At least 18 historical episodes of similar large-scale losses of honey bees dating back to 1869

Dr. Doug Yanega is the Senior Museum Scientist at the University of California, Riverside, and an acting Commissioner of the International Commission on Zoological Nomenclature. His undergraduate and graduate degrees were under the tutelage of George Eickwort (Cornell University) and Charles D. Michener (University of Kansas), respectively, two of the world's foremost bee authorities. Dr. Yanega has a broad background, and many of his publications deal with the natural history, pollination ecology, and taxonomy of bees.

Doug published this on Facebook, and I wanted this to get a broader audience, so invited him here for a guest post.



Back in 2006, a team of bee researchers put out a report regarding a phenomenon affecting honey bees commonly called “Fall Dwindle Disease”, in which they decided that this name was misleading, and suggested a new name for this syndrome – the name they suggested as a replacement was “Colony Collapse Disorder” (CCD). It’s worth reading it (at <http://www.beekeeping.com/articles/us/ccd.pdf>), not only to get some perspective on things, but because – amazingly enough – even though this is the document that first used and defined the term, virtually no one who has published on CCD has ever cited this document... not even the people who wrote it.

To anyone acquainted with scientific research or journalism, the idea of using a term that was recently defined and NOT citing (or at least reading) the original definition goes completely against what anyone would consider to be proper research. Basically, not doing one’s homework. Yet, this is precisely what has happened with this document. It can’t even be retrieved from the website on which it originally appeared, but if you’ve read it, you’re now better educated on the history of CCD than many of the scientists and journalists and beekeepers who have published on CCD in the past 7 years.

Why do I stress this so much? It’s quite straightforward: most of the scientists and journalists and beekeepers who have published on CCD in the past 7 years have either stated or implied that CCD is something that had never existed prior to 2006. And yet, the original paper defining CCD spelled out that it was an existing condition that they were simply coining a new name for, in the hope that the new name would be less misleading. Oh, the irony. Even more baffling is that it’s not like this information was totally lost or hidden – it’s been visible in the Wikipedia article (http://en.wikipedia.org/wiki/Colony_collapse_disorder), with a citation, for all this time, so anyone in the world who simply Googled “Colony Collapse Disorder” could find this reference, since the WikiP article is the first link shown.

It gets even better: in both [2007](#) and 2009 [another paper](#) pointed out that there were at least **18 historical episodes of similar large-scale losses of honey bees dating back to 1869**, at least several of which had symptoms similar enough that they **cannot be ruled out as being the exact same ailment**. Yet, how often have you seen any of the scientists and journalists and beekeepers acknowledging that any theories about the cause of CCD need to accommodate the evidence for similar bee crashes that pre-date neonicotinoid pesticides, high-fructose corn syrup (HFCS), migratory beekeeping, cell phones, genetically modified crops, or any of the other human-made “causes” that have been run up the proverbial flagpole?

Once again, there are an awful lot of people who are not doing their homework (admittedly, it is a big body of literature, but we’re talking about papers *central* to the issue). That 2009 paper also included the following statement, and I’ll quote it because it’s so important:

“Of the more than 200 variables we quantified in this study, 61 were found with enough frequency to permit meaningful comparisons between populations. None of these measures on its own could distinguish CCD from control colonies.”

Of the 61 variables quantified (including adult bee physiology, pathogen loads, and pesticide levels), no single factor was found with enough consistency to suggest one causal agent. Bees in CCD colonies had higher pathogen loads and were co-infected with more pathogens than control populations, suggesting either greater pathogen exposure or reduced defenses in CCD bees.” Yes, this study did actually look for connections to

pesticides, Varroa mites, beekeeping practices, and other things, and no such connections held up to scientific scrutiny.

Here's the thing about this: if you look at a lot of what you see these days, be it in the scientific literature or in the media, people are running around looking for things that kill honey bees, and when they find something that does so, they often make this GARGANTUAN leap to claim that since X kills honey bees, and since CCD kills honey bees, then X must cause CCD. Logic fail, anyone?

Does anyone seriously dispute that neonicotinoid pesticides are capable of killing honey bees? No. Does anyone dispute that Varroa mites can kill honey bees? No. Does anyone dispute that Nosema (a microsporidian fungus) kills honey bees? No. Sure, there are some ridiculous claims that no one in the scientific community WOULD stand behind (e.g., cell phones or chemtrails), but, by and large, most of the things that any one team of researchers or another puts forward as THE cause of CCD are things that, in and of themselves, are perfectly plausible as significant sources of bee mortality. But that DOES NOT mean that any of them is causally linked to CCD.



Why not? Go back and read the papers I linked; (1) there's a list of symptoms that characterize CCD, which are not universally present in these various "smoking gun" studies, and (2) they're talking about something dating back to the 1800s. Did they have neonicotinoids or HFCS back in 1869? In 1969? If not, then those studies fail to do what ANY genuinely scientific hypothesis needs to do: offer an explanation consistent with ALL of the evidence (Occam's Razor, anyone?).

In effect, what is happening is that researchers are studying one possible factor at a time, and seeing only a tiny part of the whole picture. It's the parable of "The Blind Men and the Elephant", where each one describes only that which is in their range of perception, instead of examining ALL of the evidence (including reading ALL of the literature) and coming up with a theory which explains all of it. We've got a pile of incomplete theories all competing for the media spotlight, each with its own proponents, and sometimes with a non-scientific agenda. They're using a single name, CCD, but may be using it to describe a pile of entirely different ailments. Even worse, there are fringe theories and fuzzy thinking and red herrings abounding, and the public can get easily confused – for example, not realizing that there are some 20,000 species of bees in the world, and only ONE of them is affected by CCD (yes, some other species of bees are dying off, but it's a different set of things that are responsible).

What may well be a complete and sensible theory is out there, however, and it is referred to above, and hinted at elsewhere (mostly by folks who were involved with the original CCD work) though it has not yet been fully explored or elucidated to everyone's satisfaction; I'll highlight again the phrase "reduced defenses in CCD bees." Way back when this whole thing came to everyone's attention, Diana Cox-Foster and the other researchers made observations suggesting that CCD might be the result of bees with a compromised immune system.

For those of us who remember when AIDS first came to public attention, there are some striking parallels, and it wouldn't be all that surprising to ultimately find out that CCD is something that works in much the same way. That is, if you have bees with a compromised immune system, then they could become vulnerable in such a way that a whole range of things that normally might NOT be lethal, are suddenly lethal.

Honey bees are exposed to all sorts of pathogens, chemicals (including not just pesticides, but HFCS, and mite-killing agents used by beekeepers), and other stress-inducing factors on a routine basis, and the levels of exposure to these factors are normally not enough to kill off healthy colonies. But if they are NOT actually healthy, and instead are immuno-compromised, then those same levels of exposure might trigger something catastrophic. Recall that the HIV virus does not itself kill people; the causes of death in AIDS victims are a variety of other diseases that would ordinarily have been fought off by the immune system. If no one had ever discovered the HIV virus, we would be seeing evidence of people dying from all sorts of other things, and likely pointing blame at each factor independently, while missing that there was something connecting them all. Sound familiar? There is (and has been, all along) evidence that CCD is contagious, yet how often is that discussed? That evidence needs to be accounted for, **along with** all of the other patterns we're seeing. There are people looking for viruses and other pathogens that could be at the root of CCD, and some tantalizing results have appeared – though such announcements haven't been definitive, and (perhaps more importantly) haven't gotten more attention than the incomplete (but more sensational) theories have gotten.

Not only would it be nice if more of the people who reviewed papers trying to link various things to CCD asked pointed questions like "How well can this theory explain similar bee dieoffs in the previous century?" or "How

well can this theory explain the patterns of contagious pathology seen in CCD-affected apiaries?”, but it would also be far more professional and appropriate to do so, given that the scientific method is not based on cherry-picking of evidence, or sensationalism. I’m prepared to find out that I’m wrong, but I want to see some real evidence, for which there is an unambiguous and coherent explanation.

A reasonable question you could ask is “Well, even if we accept the idea that there’s an underlying pathogen, why is this all happening now, and to this degree, and over this length of time? If this is the same disease we’ve seen outbreaks of spanning several decades, why does this seem so much worse this time around?” I can offer two observations: (1) the way the modern news media network seeks out and reports on stories is VERY different, as is the level of environmental concern among the general public, and even if the exact same thing DID happen in the 1960s, it would not have made international news headlines; and (2) there are, quite simply, MORE potentially harmful things that honey bees are exposed to now than they were in the past – meaning that if the dieoffs are more widespread, more severe, and more prolonged, it should not be all that surprising.



A reasonable course of action, to my mind, is acknowledging that we aren’t likely to find that any man-made factors are the true cause of CCD, devoting energy to looking for contagious pathogenic agents, and taking a closer look at genetic diversity in honey bees themselves (e.g., are there strains that are resistant to CCD?), while **at the same time** working towards reducing the exposure and impacts of man-made factors that are capable of harming bees (but without **BLAMING** them in the process, or overreacting). Does every potentially harmful thing need to be banned outright, or just used more prudently? Is there a level of exposure to neonicotinoids that is not harmful? Can beekeepers simply use less HFCS, or less or different acaricides, or make other changes to their practices that will result in fewer bee deaths? Answers may not be simple, nor black-and-white, but real science rarely is.

[P.S. from Doug - the day after I first posted this on Facebook, the [USDA released this PDF](#), in which the pre-2006 existence of CCD is once again not mentioned, despite having nearly all of the original co-authors among the 175 conference attendees. This is remarkable, and makes me wonder if people are intentionally trying to distance themselves from the original definition of CCD. It’s almost like someone publishing a paper coining the term “lung cancer” and then other people coming along and using that same term for every other known form of cancer, to the point where the original concept has been forgotten entirely.

The report states explicitly that honey bees are suffering from multiple different things, which I can’t dispute, and “CCD” is (at this point) being used as a blanket term for things that may have genuinely separate causes – but this is a practice I don’t like. If we **KNOW** there are multiple causes and multiple effects, then it confuses the issue to lump them all under a single name, and you’re going to have serious problems coming to solid conclusions about treatment, prevention, and epidemiology, not to mention communicating with the public. I’ll give just one example to make my point: several studies show that parasitic Varroa mites are strongly linked to CCD, and several other perfectly valid studies show that CCD can kill bees that have no Varroa mites. The net effect is that all we can say is “Beekeepers should prevent their bees from getting Varroa mites” – which is something everyone has known for decades. But if it turns out that some of the chemicals used to kill Varroa mites also weaken the bees, then by failing to tease apart the different contributing factors, we’ve made a vague recommendation that might have negative consequences. I’m not saying teasing these things apart is easy – experimental research on honey bee pathology is incredibly difficult, because it’s nearly impossible to get large numbers of replicates, or establish proper controls for all variables – but I still think that we should **TRY** to keep the different causes separate, and maybe we can some day figure out what the **original** CCD was.

Other things you might want to read about pesticides and bees:

- [Bees, Pesticides, and CCD: What’s the evidence?](#)
- [Bees and pesticides \(again\)](#)
- [The Beepocalypse](#)
- [It’s hard out there for a bee](#)

http://www.eurekalert.org/pub_releases/2013-05/plos-lpn050113.php

Laughter perception networks in brain different for mocking, joyful or ticklish laughter *Cerebral connectivity patterns differ based on auditory, social information in laughter*

A laugh may signal mockery, humor, joy or simply be a response to tickling, but each kind of laughter conveys a wealth of auditory and social information. These different kinds of laughter also spark different connections within the “laughter perception network” in the human brain depending on their context, according to research

published May 8 in the open access journal PLOS ONE by Dirk Wildgruber and colleagues from the University of Tuebingen, Germany.

Laughter in animals is a form of social bonding based on a primordial reflex to tickling, but human laughter has come a long way from these playful roots. Though many people laugh when they're tickled, 'social laughter' in humans can be used to communicate happiness, taunts or other conscious messages to peers. Here, researchers studied participants' neural responses as they listened to three kinds of laughter: joy, taunt and tickling.

"Laughing at someone and laughing with someone leads to different social consequences," says Wildgruber. "Specific cerebral connectivity patterns during perception of these different types of laughter presumably reflect modulation of attentional mechanisms and processing resources.

The researchers found that brain regions sensitive to processing more complex social information were activated when people heard joyous or taunting laughter, but not when they heard the 'tickling laughter'. However, 'tickling laughter' is more complex than the other types at the acoustic level, and consequently activated brain regions sensitive to this higher degree of acoustic complexity. These dynamic changes activated and connected different regions depending on the kind of laughter participants heard. Patterns of brain connectivity can impact cognitive function in health and disease. Though some previous research has examined how speech can influence these patterns, this study is among the first few to examine non-verbal vocal cues like laughter.

Wildgruber D, Szameitat DP, Ethofer T, Bruck C, Alter K, et al. (2013) Different Types of Laughter Modulate Connectivity within Distinct Parts of the Laughter Perception Network. PLoS ONE 8(5): e63441. doi:10.1371/journal.pone.0063441
Financial Disclosure: This study was financially supported by the German Research Foundation (DFG WI 2101/2-1 and DFG SZ 267/1-1; ULR: <http://www.dfg.de>) and the Open Access Publishing Fund of Tuebingen University. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Competing Interest Statement: The authors have declared that no competing interests exist.

<http://dx.plos.org/10.1371/journal.pone.0063441>

http://www.eurekalert.org/pub_releases/2013-05/plos-iac050113.php

In ancient China, sago palms were major plant food prior to rice cultivation

Starch granules on Neolithic tools resemble those of sago palms, bananas, tubers

Before rice cultivation became prevalent, ancient populations on the southern coast of China likely relied on sago palms as staple plant foods, according to research published May 8 in the open access journal PLOS ONE by Xiaoyan Yang and colleagues from the Chinese Academy of Sciences in Beijing, China.

Little is known about prehistoric diets of those who lived in southern subtropical China, as the acidic soils and humid climate of the region cause poor preservation of plant remains. Though literature and archaeological discoveries have suggested that roots and tubers were the staple foods in this region, no direct evidence has so far been found. In this study, researchers analyzed starch granules recovered from Neolithic stone tools used approximately 3,350-2,470 BC, and found these to resemble starches typically found in sago-type palms. They found that people at this time also likely relied on bananas, acorns and freshwater roots and tubers as important plant foods prior to the cultivation of rice.

Citation: Yang X, Barton HJ, Wan Z, Li Q, Ma Z, et al. (2013) Sago-type Palms Were an Important Plant Food Prior to Rice in Southern Subtropical China. PLoS ONE 8(5): e63148. doi:10.1371/journal.pone.0063148

Financial Disclosure: Funding for this research was provided in part by the Royal Society (UK)-China NSFC International Joint Projects (Grant No. 41011130159), the National Natural Science Foundation of China (Grant No. 41072140), and the CAS Strategic Priority Research Program (Grant No. XDA05130603). The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

http://www.eurekalert.org/pub_releases/2013-05/ps-wwa050813.php

Whole walnuts and their extracted oil improve cardiovascular disease risk

Eating whole walnuts or their extracted oil can reduce cardiovascular risk

Consumption of whole walnuts or their extracted oil can reduce cardiovascular risk through a mechanism other than simply lowering cholesterol, according to a team of Penn State, Tufts University and University of Pennsylvania researchers. "We already know that eating walnuts in a heart-healthy diet can lower blood cholesterol levels," said Penny Kris-Etherton, Distinguished Professor of Nutrition, Penn State. "But, until now, we did not know what component of the walnut was providing this benefit. Now we understand additional ways in which whole walnuts and their oil components can improve heart health."

In a randomized-controlled trial, the researchers gave 15 participants with elevated blood cholesterol one of four treatments -- either 85 grams of whole walnuts, 6 grams of skin, 34 grams of defatted nutmeat, or 51 grams of oil. The team evaluated biochemical and physiological responses in the participants before the treatments were administered and again 30 minutes, one hour, two hours, four hours and six hours after administering the treatments. The researchers repeated this process for each of the remaining three treatments.

Results -- which will appear in the June 1 issue of the Journal of Nutrition and are now online -- showed that a one-time consumption of the oil component in walnuts favorably affected vascular health. In addition, consumption of whole walnuts helped HDL - good cholesterol - perform more effectively in transporting and removing excess cholesterol from the body.

"Our study showed that the oil found in walnuts can maintain blood vessel function after a meal, which is very important given that blood vessel integrity is often compromised in individuals with cardiovascular disease," said Claire Berryman, graduate student in nutritional sciences, Penn State. "The walnut oil was particularly good at preserving the function of endothelial cells, which play an important role in cardiovascular health." According to the researchers, walnuts contain alpha-linolenic acid, gamma-tocopherol and phytosterols, which may explain the positive effects of the walnut oil treatment.

"Implications of this finding could mean improved dietary strategies to fight heart disease," said Berryman.

"The science around HDL functionality is very new, so to see improvements in this outcome with the consumption of whole walnuts is promising and worth investigating further."

Further studies are needed to determine the mechanisms that account for cardiovascular disease risk reduction with walnut consumption, according to Kris-Etherton. "Our study indicates that simple dietary changes, such as incorporating walnuts and/or their oil in a heart healthy diet, may reduce the risk of heart disease," she said.

Other authors on the paper include Jessica Grieger and Sheila West of Penn State, Oliver Chen and Jeffrey Blumberg of Tufts University, and George Rothblat and Sandhya Sankaranarayanan of the University of Pennsylvania.

The California Walnut Board funded this research.

http://www.eurekalert.org/pub_releases/2013-05/cp-rhf050313.php

Rejuvenating hormone found to reverse symptoms of heart failure

Injecting mice with growth differentiation factor 11, which declines with age showed a reversal in signs of cardiac aging

Heart failure is one of the most debilitating conditions linked to old age, and there are no specific therapies for the most common form of this condition in the elderly. A study published by Cell Press May 9th in the journal Cell reveals that a blood hormone known as growth differentiation factor 11 (GDF11) declines with age, and old mice injected with this hormone experience a reversal in signs of cardiac aging. The findings shed light on the underlying causes of age-related heart failure and may offer a much-needed strategy for treating this condition in humans.

"There has been evidence that circulating bloodstream factors exist in mammals that can rejuvenate tissues, but they haven't been identified. This study found the first factor like this," says senior study author Richard Lee of the Harvard Stem Cell Institute and Brigham and Women's Hospital.

Heart failure is a condition in which the heart can't pump enough blood to meet the body's needs, causing shortness of breath and fatigue, and it is becoming increasingly prevalent in the elderly. The most common form of age-related heart failure involves thickening of heart muscle tissue. But until now, the molecular causes and potential treatment strategies for this condition have been elusive.

To identify molecules in the blood responsible for age-related heart failure, a team led by Lee and Amy Wagers of the Harvard Stem Cell Institute and Joslin Diabetes Center used a well-established experimental technique: they surgically joined pairs of young and old mice so that their blood circulatory systems merged into one. After being exposed to the blood of young mice, old mice experienced a reversal in the thickening of heart muscle tissue. The researchers then screened the blood for molecules that change with age, discovering that levels of the hormone GDF11 were lower in old mice compared with young mice.

Moreover, old mice treated with GDF11 injections experienced a reversal in signs of cardiac aging. Heart muscle cells became smaller, and the thickness of the heart muscle wall resembled that of young mice. "If some age-related diseases are due to loss of a circulating hormone, then it's possible that restoring levels of that hormone could be beneficial," Wagers says. "We're hoping that some day, age-related human heart failure might be treated this way."

Cell, Loffredo et al.: "Growth Differentiation Factor 11 is a Circulating Factor that Reverses Age-Related Cardiac Hypertrophy."

<http://phys.org/news/2013-05-moon-earth-primitive-meteorites-analysis.html>

Water on Moon and Earth came from same primitive meteorites, analysis shows

Water on moon, Earth came from same primitive meteorites

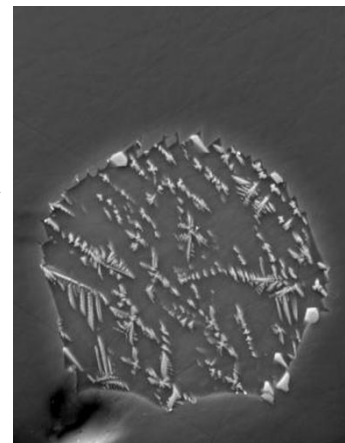
The water found on the moon, like that on Earth, came from small meteorites called carbonaceous chondrites in the first 100 million years or so after the solar system formed, researchers from Brown and Case Western Reserve universities and Carnegie Institution of Washington have found.

Evidence discovered within samples of moon dust returned by lunar crews of Apollo 15 and 17 dispels the theory that comets delivered the molecules. The research is published online in Science Express today.

The discovery's telltale sign is found in the ratio of an isotopic form of hydrogen, called deuterium, to standard hydrogen. The ratio in the Earth's water and in water from specks of volcanic glass trapped in crystals within moon dust match the ratio found in the chondrites. The proportions are far different from those in comet water. The moon is thought to have formed from a disc of debris left when a giant object hit the Earth 4.5 billion years ago, very early in Earth's history. Scientists have long assumed that the heat from an impact of that size would cause hydrogen and other volatile elements to boil off into space, meaning the moon must have started off completely dry. But recently, NASA spacecraft and new research on samples from the Apollo missions have shown that the moon actually has water, both on and beneath its surface.

By showing that water on the moon and Earth came from the same source, this new study offers yet more evidence that the moon's water has been there all along, or nearly so. "The simplest explanation for what we found is that there was water on the proto-Earth at the time of the giant impact," said Alberto Saal, a geochemist at Brown University and the study's lead author. "Some of that water survived the impact, and that's what we see in the moon."

Or, the proto-moon and proto-Earth were showered by the same family of carbonaceous chondrites soon after they separated, said James Van Orman, professor of earth, environmental and planetary sciences at Case Western Reserve, and a co-author.



Backscatter electron image of a lunar melt inclusion from Apollo 17 sample 74220, enclosed within an olivine crystal.

The inclusion is 30 μm in diameter. Skeletal crystals within the melt inclusion are a fine mixture of olivine and ilmenite. Dark area in the lower-left is an ion microprobe sputter crater. Credit: John Armstrong, Geophysical Laboratory, Carnegie Institution of Washington

The other authors are Erik Hauri, of the Carnegie Institution, and Malcolm Rutherford, from Brown.

To find the origin of the moon's water, the researchers looked at the trapped volcanic glass, referred to as a melt inclusion. The surrounding olivine crystals prevent water from escaping during an eruption, providing researchers an idea of what the inside of the moon is like.

Research from 2011, led by Hauri, found that the melt inclusions have plenty of water - as much water, in fact, as lavas forming on the Earth's ocean floor. This study aimed to find the origin of that water. To do that, Saal and his colleagues looked at the isotopic composition of the hydrogen trapped in the inclusions. Using a Cameca NanoSIMS 50L multicollector ion microprobe at Carnegie, the researchers measured the amount of deuterium in the samples compared to the amount of regular hydrogen. Deuterium has an extra neutron.

Water molecules originating from different places in the solar system have different amounts of deuterium. In general, things formed closer to the sun have less deuterium than things formed further out.

The investigators found that the deuterium/hydrogen ratio in the melt inclusions was relatively low and matched the ratio found in carbonaceous chondrites. These meteorites originated in the asteroid belt near Jupiter and are thought to be among the oldest objects in the solar system. That means the source of the water on the moon is primitive meteorites.

Comets, like meteorites, are known to carry water and other volatiles. But most comets were formed in the icy Oort Cloud, more than 1,000 times more distant than Neptune. Because comets formed so far from the sun, they tend to have high deuterium/hydrogen ratios - much higher ratios than in the moon's interior, where the samples in this study originated.

"The measurements themselves were very difficult," Hauri said, "but the new data provide the best evidence yet that the carbon-bearing chondrites were a common source for the volatiles in the Earth and moon, and perhaps the entire inner solar system."

To determine the ratios that would currently be found deep in the moon's interior, Van Orman and Saal modeled the loss of gasses from inside melt inclusions and the influence of degassing on the deuterium. The researchers also had to take into account the impact of cosmic rays - high-energy rays that carry charged particles - on the water trapped inside the inclusions. The interaction produces more deuterium than hydrogen. In total, the effects proved to be small for the melt inclusions, and the ratios remained consistent with the those of the chondrites.

Recent research, Saal said, has found that as much as 98 percent of the water on Earth also comes from primitive meteorites, suggesting a common source for water on Earth and the moon. The easiest way to explain that, Saal said, is that the water was already present on the early Earth and was transferred to the moon.

The finding is not necessarily inconsistent with the idea that the moon was formed by a giant impact with the early Earth, but presents a problem. If the moon is made from material that came from the Earth, it makes sense that the water in both would share a common source, Saal said. However, there's still the question of how that water was able to survive such a violent collision.

"Our work suggests that even highly volatile elements may not be lost completely during a giant impact," said Van Orman. "We need to go back to the drawing board and discover more about what giant impacts do, and we also need a better handle on volatile inventories in the moon."

More information: "Hydrogen Isotopes in Lunar Volcanic Glasses and Melt Inclusions Reveal a Carbonaceous Chondrite Heritage," by A.E. Saal et al. Science Express, 2013.

http://www.eurekalert.org/pub_releases/2013-05/uops-dco050913.php

Doctor's choice of words may influence family's decision to permit CPR in critically ill

A physician's choice of words when talking with family members about whether or not to try cardiopulmonary resuscitation (CPR) if a critically ill patient's heart stops may influence the decision

PITTSBURGH - A physician's choice of words when talking with family members about whether or not to try cardiopulmonary resuscitation (CPR) if a critically ill patient's heart stops may influence the decision, according to a study by University of Pittsburgh researchers in the June edition of Critical Care Medicine and now available online.

"It's long been known that the way a choice is framed can influence people's decisions," noted Amber E. Barnato, M.D., M.P.H., M.S., lead author of the study and associate professor of clinical and translational science at the University of Pittsburgh School of Medicine. "Our study shows that the words physicians use may play an important role in determining critical end-of-life decisions."

For this first-of-its-kind study, Dr. Barnato and her team recruited more than 250 adult children or spouses in eight cities: Boston, Atlanta, New York, Los Angeles, San Francisco, Dallas, Denver and Pittsburgh. The participants took part in a Web-based survey involving a hypothetical situation in which a loved one was in the intensive care unit with a 40 percent chance of dying from sepsis, a dangerous bacterial infection. Some subjects were shown a photo of their loved ones to help them imagine the situation and heighten the emotional response. An actor portrayed a physician who held a virtual, interactive meeting with the family member. The "doctor's" responses varied, using different words for the same scenarios. Additionally, some offered emotional support, and others offered only clinical information.

A key finding was that when participants were asked to choose between having their loved ones receive CPR if their hearts should stop - a treatment with a 10 percent chance of successfully reviving them - or the alternative, a "Do Not Resuscitate" (DNR) order, 60 percent chose CPR. When the alternative was described as to "allow natural death" instead of a DNR order, the number choosing CPR dropped to 49 percent.

When the actor cited "his own experience" about how most others handled such a situation, family members were more likely to choose what they believed was the common approach.

Using more empathic language did not influence CPR choice.

"Simple changes of words and perceptions about social norms resulted in large differences in CPR choices," said Dr. Barnato. "The change in terminology from 'DNR' to 'allow natural death' already has been implemented in a health system in Texas. This study suggests that the change isn't just window dressing - it makes a real difference in the choices that people make. We expect that it also may reduce feelings of guilt for choosing against CPR by making family members feel like they are doing something positive to honor their loved one's wishes at the end of life, rather than taking something away from them."

Robert M. Arnold, M.D., chief, section of palliative care and medical ethics at the University of Pittsburgh School of Medicine, co-authored the study. The work was funded by the National Institute of Nursing Research.

http://www.eurekalert.org/pub_releases/2013-05/nsf-crf050913.php

Climate record from bottom of Russian lake shows Arctic was warmer millions of years ago

Unparalleled sediment record is 'most continuous archive' of ancient Arctic climate

The Arctic was very warm during a period roughly 3.5 to 2 million years ago--a time when research suggests that the level of carbon dioxide in the atmosphere was roughly comparable to today's--leading to the conclusion that relatively small fluctuations in carbon dioxide levels can have a major influence on Arctic climate, according to a new analysis of the longest terrestrial sediment core ever collected in the Arctic.

"One of our major findings is that the Arctic was very warm in the middle Pliocene and Early Pleistocene--roughly 3.6 to 2.2 million years ago--when others have suggested atmospheric carbon dioxide was not much higher than levels we see today," said Julie Brigham-Grette, of the University of Massachusetts Amherst.

Brigham-Grette is a National Science Foundation- (NSF) funded researcher on the sediment core project and a lead author of a new paper published this week in the journal Science that describes the results.

She added that "this could tell us where we are going in the near future. In other words, the Earth system response to small changes in carbon dioxide is bigger than suggested by earlier climate models."

The data come from the analysis of a continuous cylinder of sediments collected by NSF-funded researchers from the bottom of ice-covered Lake El'gygytyn, pronounced El-Guh-Git-Kin, the oldest deep lake in the northeast Russian Arctic, located 100 kilometers (62 miles) north of the Arctic Circle. The drilling was an international project.

Drilling took place in the early months of 2009. The Earth Sciences and Polar Programs divisions of NSF's Geosciences Directorate funded the drilling and analysis. Analysis of the sediment core provides "an exceptional window into environmental dynamics" never before possible, noted Brigham-Grette.

"While existing geologic records from the Arctic contain important hints about this time period, what we are presenting is the most continuous archive of information about past climate change from the entire Arctic borderlands," she said. "Like reading a detective novel, we can go back in time and reconstruct how the Arctic evolved with only a few pages missing here and there."

Results of the core analysis, according to Brigham-Grette, have "major implications for understanding how the Arctic transitioned from a forested landscape without ice sheets to the ice- and snow-covered land we know today."

"Lake E," as it is often called, was formed 3.6 million years ago when a meteorite, perhaps a kilometer in diameter, hit the Earth and blasted out an 18-kilometer (11-mile) wide crater. The lake bottom has been accumulating layers of sediment ever since the initial impact.

The lake also is situated in one of the few areas of the Arctic that was not eroded by continental ice sheets during ice ages. So a thick, continuous sediment record was left remarkably undisturbed. Cores from Lake E reach back in geologic time nearly 25 times farther than Greenland ice cores that span only the past 140,000 years.

Important to the story are the fossil pollen found in the core, including Douglas fir and hemlock, clearly not found in this part of the Arctic today. The pollen allows the reconstruction of the vegetation living around the lake in the past, which in turn paints a picture of past temperatures and precipitation.

Another significant finding is documentation of sustained warmth in the Middle Pliocene, with summer temperatures of about 15 to 16 degrees Celsius (59 to 61 degrees Fahrenheit), about 8 degrees Celsius (14.4 degrees Fahrenheit) warmer than today, and regional precipitation three times higher.

"We show that this exceptional warmth well north of the Arctic Circle occurred throughout both warm and cold orbital cycles and coincides with a long interval of 1.2 million years when other researchers from the ANDRILL project have shown the West Antarctic Ice Sheet did not exist," the authors point out.

Hence both poles share some common history, but the pace of change differed.

Along with Brigham-Grette, her co-authors Martin Melles of the University of Cologne, Germany, and Pavel Minyuk of Russia's Northeast Interdisciplinary Scientific Research Institute, Magadan, led research teams on the project. Robert DeConto, also at the University of Massachusetts, led the climate-modeling efforts. These data were compared with ecosystem reconstructions performed by collaborators at University of Berlin and University of Cologne.

The Lake E cores provide a terrestrial perspective on the stepped pacing of several portions of the climate system through the transition from a warm, forested Arctic to the first occurrence of land ice, Brigham-Grette says, and the eventual onset of major glacial-interglacial cycles.

"It is very impressive that summer temperatures during warm intervals even as late as 2.2 million years ago were always warmer than in our pre-Industrial reconstructions," she added.

Minyuk notes that they also observed a major drop in Arctic precipitation at around the same time large Northern Hemispheric ice sheets first expanded and ocean conditions changed in the North Pacific. This has major implications for understanding what drove the onset of the ice ages.

The sediment core also reveals that even during the first major "cold snap" to show up in the record 3.3 million years ago, temperatures in the western Arctic were similar to recent averages of the past 12,000 years. "Most importantly, conditions were not 'glacial,' raising new questions as to the timing of the first appearance of ice sheets in the Northern Hemisphere," the authors add.

This week's paper is the second article published in Science by these authors using data from the Lake E project. Their first in July 2012 covered the period from the present to 2.8 million years ago, while the current work addresses the record from 2.2 to 3.6 million years.

"This latest paper completes our goal of providing an overview of new knowledge of the evolution of Arctic change across the Western borderlands back to 3.6 million years and places this record into a global context with comparisons to records in the Pacific, the Atlantic and Antarctica," Melles points out.

The Lake E paleoclimate reconstructions and climate modeling are consistent with estimates made by other research groups that support the idea that Earth's climate sensitivity to carbon dioxide may well be higher than suggested by the 2007 report of the Intergovernmental Panel on Climate Change. -NSF-

<http://bit.ly/13apNE0>

News in Brief: Japan's 2011 earthquake upped Tokyo's risk
Chance more than doubled that capital city will soon experience big temblor

By Erin Wayman

The magnitude 9 earthquake that shook Japan in 2011 more than doubled the risk that a big quake will rattle Tokyo in the next five years, geologists report May 2 in *Geophysical Research Letters*.

The 2011 quake hit 373 kilometers northeast of Tokyo. Afterwards, seismic activity around Japan's capital spiked, and small earthquakes are now three times as frequent as they were before the 2011 event. The ground movement comes from a piece of Earth's crust that's wedged between the Eurasian plate, on which Tokyo sits, and the Pacific plate, which slides into the mantle beneath the Eurasian plate.

Shinji Toda of Tohoku University in Japan and Ross Stein of the U.S. Geological Survey in Menlo Park, Calif., suggest that the 2011 quake transferred stress to the wedged fragment, triggering the increase in seismic activity. The pair calculates that the added stress raised the probability of a magnitude 7 or larger earthquake striking Tokyo in the next five years, from 6.6 percent to 17.2 percent.

S. Toda and R.S. Stein. The 2011 M=9 Tohoku oki earthquake more than doubled the probability of large shocks beneath Tokyo. Geophysical Research Letters. Published online May 2, 2013. doi: 10.1002/grl.50524.

<http://www.sciencedaily.com/releases/2013/05/130510075337.htm>

Lyme Disease Vaccine Shows Promise in Clinical Trial

Results of a phase 1/2 clinical trial of an investigational Lyme disease vaccine revealed it to be promising and well tolerated

The results of a phase 1/2 clinical trial in Europe of an investigational Lyme disease vaccine co-developed by researchers at Stony Brook University, Brookhaven National Laboratory, and at Baxter International Inc., a U.S. based healthcare company, revealed it to be promising and well tolerated, according to a research paper published online in *The Lancet Infectious Diseases*. The vaccine was shown to produce substantial antibodies against all targeted species of *Borrelia*, the causative agent of Lyme disease in Europe and the United States. Baxter International conducted the clinical trial of the vaccine.

Since the early 1990s, Benjamin Luft, MD, the Edmund D. Pellegrino Professor of Medicine at Stony Brook University School of Medicine, and the late John Dunn, Ph.D., a biologist at Brookhaven National Laboratory, spearheaded the initial development of the original vaccine antigen concept, and together with researchers at Baxter International helped bioengineer the formulation used in the clinical trial. Through the Stony Brook University School of Medicine and Brookhaven National Laboratory, The Research Foundation of the State of New York licensed intellectual property of the Lyme vaccine technology to Baxter International. Baxter International researchers in collaboration with Luft and Dunn developed further innovations employed in the Lyme vaccine used in the clinical trial.

In the article, "Safety and immunogenicity of a novel multivalent OspA vaccine against Lyme borreliosis in healthy adults: a double-blind, randomized, dose-escalation phase 1/2 trial," Principal Investigator P. Noel Barrett, PhD, of Baxter, Biomedical Research Centre, and co-authors evaluated the safety and immunogenicity of the vaccine in a range of doses in 300 people living in Austria and Germany. Study participants received three primary immunizations and one booster immunization. All doses and formulations, some of which included an adjuvant, an additive to stimulate immune response to the vaccine, induced substantial antibody titers against all species of *Borrelia*. The vaccine demonstrated predominantly mild adverse reactions and no vaccine related serious events occurred in the sample population.

"The results of the clinical trial conducted by Baxter are promising because the vaccine generated a potent human immune reaction, covered the complete range of *Borrelia* active in the entire Northern hemisphere, and produced no major side effects," said Dr. Luft, a co-author on the paper. "We hope that a larger-scale, Phase 3 trial will demonstrate not only a strong immune response but true efficacy in a large population that illustrates protection against Lyme disease."

Dr. Luft said that for years, one of the main challenges of developing a Lyme disease vaccine was to discover a method that could produce a vaccine effective on all *Borrelia* species. With the aid of technologies and expertise at Stony Brook and Brookhaven, Drs. Luft and Dunn focused vaccine development on the most

abundant Borrelia outer surface protein found when the spirochete bacteria reside in ticks, which commonly transmit the disease. Using the scaffold of this protein, called OspA, they, in collaboration with researchers at Baxter, bioengineered a set of unique OspA proteins not found in nature. These new OspAs share different parts from different species of Borrelia. The new proteins are called chimeras.

"After a series of experimentations and refinements, formulations consisting of these new OspA proteins were shown to protect against a broad spectrum of Lyme disease spirochetes," said Dr. Luft, summarizing the research results.

The vaccine used in the European clinical trial is based on these newly created OspA proteins and is therefore designed for broad based coverage.

Nina Wressnigg, Eva-Maria Pöllabauer, Gerald Aichinger, Daniel Portsmouth, Alexandra Löw-Baselli, Sandor Fritsch, Ian Livey, Brian A Crowe, Michael Schwendinger, Peter Brühl, Andreas Pilz, Thomas Dvorak, Julia Singer, Clair Firth, Benjamin Luft, Bernhard Schmitt, Markus Zeitlinger, Markus Müller, Herwig Kollaritsch, Maria Paulke-Korinek, Meral Esen, Peter G Kremsner, Hartmut J Ehrlich, P Noel Barrett. Safety and immunogenicity of a novel multivalent OspA vaccine against Lyme borreliosis in healthy adults: a double-blind, randomised, dose-escalation phase 1/2 trial. The Lancet Infectious Diseases, 2013; DOI: 10.1016/S1473-3099(13)70110-5

http://www.eurekalert.org/pub_releases/2013-05/bu-bur051013.php

Baylor University researcher finds earliest evidence of human ancestors hunting & scavenging

A recent Baylor University research study has shed new light on the diet and food acquisition strategies of some the earliest human ancestors in Africa.

WACO, Texas - Beginning around two million years ago, early stone tool-making humans, known scientifically as Oldowan hominin, started to exhibit a number of physiological and ecological adaptations that required greater daily energy expenditures, including an increase in brain and body size, heavier investment in their offspring and significant home-range expansion. Demonstrating how these early humans acquired the extra energy they needed to sustain these shifts has been the subject of much debate among researchers.

A recent study led by Joseph Ferraro, Ph.D., assistant professor of anthropology at Baylor, offers new insight in this debate with a wealth of archaeological evidence from the two million-year-old site of Kanjera South (KJS), Kenya. The study's findings were recently published in PLOS One, <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0062174>.

"Considered in total, this study provides important early archaeological evidence for meat eating, hunting and scavenging behaviors -cornerstone adaptations that likely facilitated brain expansion in human evolution, movement of hominins out of Africa and into Eurasia, as well as important shifts in our social behavior, anatomy and physiology," Ferraro said.

Located on the shores of Lake Victoria, KJS contains "three large, well-preserved, stratified" layers of animal remains. The research team worked at the site for more than a decade, recovering thousands of animal bones and rudimentary stone tools.

According to researchers, hominins at KJS met their new energy requirements through an increased reliance on meat eating. Specifically, the archaeological record at KJS shows that hominins acquired an abundance of nutritious animal remains through a combination of both hunting and scavenging behaviors. The KJS site is the earliest known archaeological evidence of these behaviors. "Our study helps inform the 'hunting vs. scavenging' debate in Paleolithic archaeology. The record at KJS shows that it isn't a case of either/or for Oldowan hominins two million years ago. Rather hominins at KJS were clearly doing both," Ferraro said.

The fossil evidence for hominin hunting is particularly compelling. The record shows that Oldowan hominins acquired and butchered numerous small antelope carcasses. These animals are well represented at the site by most or all of their bones from the tops of their head to the tips of their hooves, indicating to researchers that they were transported to the site as whole carcasses. Many of the bones also show evidence of cut marks made when hominins used simple stone tools to remove animal flesh. Some bones also bear evidence that hominins used fist-sized stones to break them open to acquire bone marrow.



This is a small antelope leg bone with cut marks, indicative of early human butchery practices. Photo courtesy of Joseph Ferraro.

In addition, modern studies in the Serengeti--an environment similar to KJS two million years ago--have also shown that predators completely devour antelopes of this size within minutes of their deaths. As a result, hominins could only have acquired these valuable remains on the savanna through active hunting.

The site also contains a large number of isolated heads of wildebeest-sized antelopes. In contrast to small antelope carcasses, the heads of these somewhat larger individuals are able to be consumed several days after death and could be scavenged, as even the largest African predators like lions and hyenas were unable to break them open to access their nutrient-rich brains.

"Tool-wielding hominins at KJS, on the other hand, could access this tissue and likely did so by scavenging these heads after the initial non-human hunters had consumed the rest of the carcass," Ferraro said. "KJS hominins not only scavenged these head remains, they also transported them some distance to the archaeological site before breaking them open and consuming the brains. This is important because it provides the earliest archaeological evidence of this type of resource transport behavior in the human lineage."

Other contributing authors to the study include: Thomas W. Plummer of Queens College & NYCEP; Briana L. Pobiner of the National Museum of Natural History, Smithsonian Institution; James S. Oliver of Illinois State Museum and Liverpool John Moores University; Laura C. Bishop of Liverpool John Moores University; David R. Braun of George Washington University; Peter W. Ditchfield of University of Oxford; John W. Seaman III, Katie M. Binetti and John W. Seaman Jr. of Baylor University; Fritz Hertel of California State University and Richard Potts of the National Museum of Natural History, Smithsonian Institution and National Museums of Kenya.

The research was supported by funding from the National Science Foundation, Leakey Foundation, Wenner-Gren Foundation, National Geographic Society, The Leverhulme Trust, University of California, Baylor University and the City University of New York. Additional logistical support was provided by the Smithsonian Institution's Human Origins Program and the Peter Buck Fund for Human Origins Research, the British Institute of Eastern Africa and the National Museums of Kenya.

<http://bit.ly/YOphzy>

Hints of lightweight dark matter get even stronger

A strange light is shining near the centre of the Milky Way, and evidence is mounting that it is the spark of lightweight dark matter meeting a violent end.

21:01 10 May 2013 by Adam Becker

At the same time, a suite of sensitive detectors deep underground is seeing hints of similar particles. Dark matter is thought to make up roughly 80 per cent of the matter in the universe. But aside from its gravitational tug on regular matter, the substance has proven tough to detect, and many of its fundamental properties remain unknown. The leading theoretical candidates for dark matter are weakly interacting massive particles (WIMPs). It's thought these particles annihilate when they meet, producing a shower of radiation, including gamma rays. Launched in 2008, NASA's Fermi space telescope has been scanning for excess gamma rays emanating from the centre of our galaxy, where dark matter should be concentrated.

Last year scientists ruled out a possible Fermi signal at 130 gigaelectronvolts (GeV) as dark matter's smoking gun. But there is another: In 2010, physicist Dan Hooper at Fermilab in Batavia, Illinois, and colleagues reported a possible hint from the space telescope of dark matter particles with a mass of about 10 GeV.

Unusual suspects

That signal has been controversial, in part because it had only been seen very close to the centre of the Milky Way, in a violent region filled with hot gas, newborn stars, supernovae and a supermassive black hole – any of which could be throwing off spare gamma rays. Rapidly rotating pulsars were also a possible explanation, since they are known to release intense bursts of radiation.

Now fresh data from Fermi, along with new analysis of the 2010 results, have increased the likelihood that the signal is indeed a result of dark matter. For one, Hooper and colleague Tracy Slatyer at the Institute for Advanced Study in Princeton, New Jersey, have found the signal far enough away from the galactic core to make it unlikely that the gamma rays are being produced in the general chaos of that region.

In a separate paper, Hooper, Slatyer and others find that pulsars are not good candidates for the signal source. The team looked at the spectra of 37 fast-spinning pulsars seen by Fermi, and found that none matches the 10 GeV signal. The numbers of pulsars thought to exist in the region also suggest that there aren't enough of them to generate the observed excess. "That doesn't leave any good alternatives," says Hooper. "I think the [gamma ray] signal as it stands is very compelling."

Tip of the iceberg

Particle detectors deep underground are also showing hints of 10 GeV dark matter. These experiments look for the light and heat given off when dark matter particles collide with nuclei in atoms such as germanium and silicon.

At a physics meeting in Denver, Colorado, last month, the collaboration behind the CDMS-II detector in the Soudan mine in Minnesota, presented evidence of three events, all at around 10 GeV. This lines up with earlier results from the CoGeNT detector, housed in the same mine.

Another pair of experiments, XENON-10 and XENON-100, had been thought to rule out 10 GeV dark matter. But two recent papers say that those calculations are missing some necessary adjustments, and the revised results no longer rule out the lightweight signal.

"Either we're seeing the tip of the iceberg – after all, this is how discoveries should be expected to come about – or there's an unfortunate conspiracy going on," says Rafael Lang, a physicist at Purdue University in West Lafayette, Indiana, and a member of the XENON-100 team. "At face value, this looks very intriguing indeed."

Call in the dwarfs

"The new papers from Slatyer and Hooper make it definitely more likely that the excess gamma rays are from dark matter," says astrophysicist Kevork Abazajian at the University of California, Irvine. Seeing the same excess gamma-ray signal elsewhere in the sky, such as from dwarf galaxies, would probably make the dark matter interpretation a paradigm instead of a curiosity, he adds.

Faint dwarf galaxies should have a lot of dark matter and not very many stars, says Risa Wechsler, a cosmologist at Stanford University. "So they're less confusing in comparison to the Milky Way, because there's less complicated stuff going on like there is in the centre of the Milky Way."

Without the wild and strange behaviour that exists at our galactic core, it could be easier to spot gamma rays from dark matter annihilation. Fermi and other telescopes are doing long-term gamma-ray observations of dwarf galaxies, but because the galaxies are so faint, it may take several more years before the results of those surveys are clear.

Break out the bubbly?

There are also some lingering doubts about the direct-detection results. That's because 10 GeV particles are at the edge of what CDMS-II can see, so it is still possible that the three events announced last month are just noise, says Slatyer. "I think people would like to see more events before getting excited, and confirmation by another experiment before breaking out the champagne," she says.

That independent confirmation may come along in a matter of months, with the first results from the LUX experiment. LUX is a larger version of the XENON detector, buried in a mineshaft beneath the Black Hills of South Dakota.

LUX just turned on earlier this year, but "it's already sensitive enough that just with a couple of months of data, if there's something like an 8- to 10-GeV [particle], then they should see it," says Wechsler. "That would certainly go a long way toward showing us that there's something there."

Journal references: arxiv.org/abs/1302.6589, arxiv.org/abs/1305.0830, arxiv.org/abs/1304.6066 and arxiv.org/abs/1304.6401

<http://www.bbc.co.uk/news/health-22479049>

Rise in obesity poses 'dementia time bomb'

Ever-growing waistlines could result in a big increase in the number of people who develop dementia in the future, researchers have warned.

Previous studies have shown that being overweight in middle age increases the odds of developing the mental disorder. Data presented at the European Congress on Obesity suggests stemming the rise in obesity will cut dementia. The Alzheimer's Society charity said regular exercise and a healthy weight were important for reducing risk. Piling on too many pounds is known to be bad for the body, but there is growing evidence that it is also bad for the mind.

£940m saving predicted

Nobody knows exactly what causes dementias such as Alzheimer's disease, but body weight appears to be a risk factor.

One study of 8,500 Swedish twins showed that those with a body mass index (BMI) greater than 30, who are classified as obese, were almost four times as likely to develop dementia as those with a normal BMI.

Even those who were clinically overweight, a BMI between 25 and 30, were 71% more likely to develop dementia. In England 24% of men and 26% of women are obese.

Researchers from the UK Health Forum used computer models to compare what would happen if obesity rates stayed the same or increased to 46% of men and 31% of women by 2050, which has been predicted by some groups. They said rates of dementia would go from 4,894 cases in every 100,000 people over 65 to 6,662 cases in every 100,000 people over 65.

Keeping obesity levels constant would save around £940m in dementia care, the study predicted.

'Immediate impact'

Tim Marsh of UK Health Forum said: "We've known for a long time about the risks to cardiovascular disease, stroke, cancer, type 2 diabetes, so this is a new concern. "Obesity is a major concern that's going to have a major economic impact on the country and this further compounds that. "The trouble is there's a 25-year lag in this. Obesity started increasing in the 80s."

Jessica Smith, a research officer at Alzheimer's Society, said: "It's easy to see the immediate impact of piling on the pounds, but we can't afford to ignore the long-term effects. "Evidence shows that obesity increases the risk of developing dementia. This study highlights the impact obesity will have on the numbers of people with the condition in the future. She added that "maintaining a healthy weight and exercising regularly - especially in midlife - are hugely important in reducing your risk".

<http://bit.ly/12oWOGX>

New SARS-Like Virus Can Probably Pass Person-to-Person

World Health Organization (WHO) officials said on Sunday it seemed likely a new coronavirus that has killed at least 18 people in the Middle East and Europe could be passed between humans, but only after prolonged contact.

by Reuters

A virus from the same family triggered the outbreak of Severe Acute Respiratory Syndrome (SARS) that swept the world after emerging in Asia and killed 775 people in 2003. On Sunday French authorities announced that a second man had been diagnosed with the disease after sharing a hospital room with France's only other sufferer. WHO Assistant Director-General Keiji Fukuda told reporters in Saudi Arabia, the site of the largest cluster of infections, there was no evidence so far the virus was able to sustain "generalized transmission in communities" - a scenario that would raise the specter of a pandemic.

But he added: "Of most concern... is the fact that the different clusters seen in multiple countries... increasingly support the hypothesis that when there is close contact, this novel coronavirus can transmit from person to person." "There is a need for countries to... increase levels of awareness," he said.

A public health expert who declined to be identified, said "close contact" meant being in the same small, enclosed space with an infected person for a prolonged period.

The virus first emerged in the Gulf last year, but deaths have also been recorded in Britain and France of people who had recently been in the Middle East. A total of 34 cases worldwide have been confirmed by blood tests so far.

New deaths

Saudi Deputy Health Minister for Public Health Ziad Memish told reporters that, of 15 confirmed cases in the most recent outbreak, in al-Ahsa district of Eastern Province, nine had died, two more than previously reported. Saudi Arabia's Health Ministry said in a statement the country had had 24 confirmed cases since last summer, of whom 15 had died. Fukuda said he was not sure if the two newly reported Saudi deaths were included in the numbers confirmed by the WHO. Memish added that three suspected cases in Saudi Arabia were still under investigation, including previous negative results that were being re-examined.

The first French patient was confirmed as suffering from the disease on Wednesday after travelling in the Gulf. The second patient was transferred to intensive care on Sunday after the two men shared a room in a hospital in Lille.

Professor Benoit Guery, head of the Lille hospital's infectious diseases unit, said the first patient had not been immediately isolated because he presented "quite atypical" symptoms. He added in comments broadcast by BFMTV channel the case suggested that airborne transmission of the virus was possible, though still unusual, and that the public "should not be concerned" as there had been only 34 cases globally in a year.

Fukuda, part of a WHO team visiting Saudi Arabia to investigate the spread of the disease, said although no specific vaccine or medication was yet available for novel coronavirus, patients were responding to treatment. "The care that is taken in the hospitals, in terms of using respirators well, in terms of treating pneumonia, in terms of treating complications, in terms of providing support, these steps can get patients through this very severe illness," he said.

Fukuda said that as far as he knew all cases in the latest outbreak in al-Ahsa district were directly or indirectly linked to one hospital. He added that Saudi Arabian authorities had taken novel coronavirus very seriously and had initiated necessary health measures such as increased surveillance systems.

http://www.eurekalert.org/pub_releases/2013-05/uab-ecp050913.php

Carnivorous plant throws out 'junk' DNA

The newly sequenced genome of the carnivorous bladderwort contradicts the notion that vast quantities of noncoding DNA are crucial for complex life

IRAPUATO, MEXICO/BUFFALO, N.Y. — Genes make up about 2 percent of the human genome. The rest consists of a genetic material known as noncoding DNA, and scientists have spent years puzzling over why this material exists in such voluminous quantities. Now, a new study offers an unexpected insight: The large majority of noncoding DNA, which is abundant in many living things, may not actually be needed for complex life, according to research set to appear in the journal *Nature*.

The clues lie in the genome of the carnivorous bladderwort plant, *Utricularia gibba*.

The *U. gibba* genome is the smallest ever to be sequenced from a complex, multicellular plant. The researchers who sequenced it say that 97 percent of the genome consists of genes — bits of DNA that code for proteins — and small pieces of DNA that control those genes.

It appears that the plant has been busy deleting noncoding "junk" DNA from its genetic material over many generations, the scientists say. This may explain the difference between bladderworts and junk-heavy species like corn and tobacco — and humans.

The international research team, led by the Laboratorio Nacional de Genómica para la Biodiversidad (LANGEBIO) in Mexico and the University at Buffalo, will report its findings on May 12 in *Advanced Online Publication in Nature*, and the information in this press release is embargoed until 1 p.m. U.S. Eastern Time on May 12.

The study was directed by LANGEBIO Director and Professor Luis Herrera-Estrella and UB Professor of Biological Sciences Victor Albert, with contributions from scientists in the United States, Mexico, China, Singapore, Spain and Germany.

"The big story is that only 3 percent of the bladderwort's genetic material is so-called 'junk' DNA," Albert said. "Somehow, this plant has purged most of what makes up plant genomes. What that says is that you can have a perfectly good multicellular plant with lots of different cells, organs, tissue types and flowers, and you can do it without the junk. Junk is not needed."

Noncoding DNA is DNA that doesn't code for any proteins. This includes mobile elements called jumping genes that have the ability to copy (or cut) and paste themselves into new locations of the genome.

Scientists have spent countless hours puzzling over why noncoding DNA exists — and in such copious amounts. A recent series of papers from ENCODE, a highly publicized international research project, began to offer an explanation, saying that the majority of noncoding DNA (about 80 percent) appeared to play a role in biochemical functions such as regulation and promotion of DNA conversion into its relative, RNA, which for genes, feeds into the machinery that makes proteins.

But Herrera-Estrella, Albert and their colleagues argue that organisms may not bulk up on genetic junk for reasons of benefit.

Instead, they say, some species may simply have an inherent, mechanistic bias toward deleting a great deal of noncoding DNA while others have a built-in bias in the opposite direction — toward DNA insertion and duplication. These biases are not due to the fact that one way of behaving is more helpful than the other, but because there are two innate ways to behave and all organisms adhere to them to one degree or the other. The place that organisms occupy on this sliding scale of forces depends in part on the extent to which Darwin's natural selection pressure is able to counter or enhance these intrinsic biases.

The new *U. gibba* genome shows that having a bunch of noncoding DNA is not crucial for complex life. The bladderwort is an eccentric and complicated plant. It lives in aquatic habitats like freshwater wetlands, and has developed corresponding, highly specialized hunting methods. To capture prey, the plant pumps water from tiny chambers called bladders, turning each into a vacuum that can suck in and trap unsuspecting critters.

The *U. gibba* genome has about 80 million DNA base pairs — a miniscule number compared to other complex plants — and the deletion of noncoding DNA appears to account for most of that size discrepancy, the researchers say. *U. gibba* has about 28,500 genes, comparable to relatives like grape and tomato, which have much larger genomes of about 490 and 780 million base pairs, respectively.

The small size of the *U. gibba* genome is even more surprising given the fact that the species has undergone three complete genome doublings since its evolutionary lineage split from that of tomato.

That is, at three distinct times in the course of its evolution, the bladderwort's genome doubled in size, with offspring receiving two full copies of the species' entire genome. "This surprisingly rich history of duplication, paired with the current small size of the bladderwort genome, is further evidence that the plant has been prolific at deleting nonessential DNA, but at the same time maintaining a functional set of genes similar to those of other plant species" says Herrera-Estrella.

Besides LANGEBIO and UB, institutions with researchers contributing to the study included: University of Arizona, Tucson; Universidad de Guanajuato, Irapuato; Chongqing University of Science and Technology; Departamento de Genética, Unidad Irapuato, Centro de Investigación y de Estudios Avanzados del Instituto Politécnico Nacional; Universidad Veracruzana; Michigan State University; Universidad de Guadalajara, Ocoitlán; Pennsylvania State University; Nanyang Technological University; Centre for Genomic Regulation in Barcelona; Universitat Pompeu Fabra; Max Planck Institute for Molecular Genetics; Indiana University; Rutgers University; and the Donald Danforth Plant Science Center.

The study was supported by CONACyT (Mexico), Howard Hughes Medical Institute, the University at Buffalo College of Arts and Sciences and the National Science Foundation.

<http://nyti.ms/17l2n5Q>

Engineering the \$325,000 Burger

As a gastronomic delicacy, the five-ounce hamburger that Mark Post has painstakingly created here surely will not turn any heads. But Dr. Post is hoping that it will change some minds.

By HENRY FOUNTAIN

MAASTRICHT, the Netherlands —The hamburger, assembled from tiny bits of beef muscle tissue grown in a laboratory and to be cooked and eaten at an event in London, perhaps in a few weeks, is meant to show the world — including potential sources of research funds — that so-called in-Vitro meat, or cultured meat, is a reality.

“Let’s make a proof of concept, and change the discussion from ‘this is never going to work’ to, ‘well, we actually showed that it works, but now we need to get funding and work on it,’” Dr. Post said in an interview last fall in his office at Maastricht University.

Down the hall, in a lab with incubators filled with clear plastic containers holding a pinkish liquid, a technician was tending to the delicate task of growing the tens of billions of cells needed to make the burger, starting with a particular type of cell removed from cow necks obtained at a slaughterhouse.

The idea of creating meat in a laboratory — actual animal tissue, not a substitute made from soybeans or other protein sources — has been around for decades. The arguments in favor of it are many, covering both animal welfare and environmental issues.

A 2011 study in the journal *Environmental Science and Technology*, for example, showed that full-scale production of cultured meat could greatly reduce water, land and energy use, and emissions of methane and other greenhouse gases, compared with conventional raising and slaughtering of cattle or other livestock. Those environmental arguments will only gain strength, advocates say, as worldwide demand for meat increases with the rise of middle-class populations in China and elsewhere.

Dr. Post, one of a handful of researchers in the field, has made strides in developing cultured meat through the use of stem cells — precursor cells that can turn into others that are specific to muscle — and techniques adapted from medical research for growing tissues and organs, a field known as tissue engineering. (Indeed, Dr. Post, a physician, considers himself first and foremost a tissue engineer, and about four-fifths of his time is dedicated to studying how to build blood vessels.)

Yet growing meat in the laboratory has proved difficult and devilishly expensive. Dr. Post, who knows as much about the subject as anybody, has repeatedly postponed the hamburger cook-off, which was originally expected to take place in November. His burger consists of about 20,000 thin strips of cultured muscle tissue. Dr. Post, who has conducted some informal taste tests, said that even without any fat, the tissue “tastes reasonably good.” For the London event he plans to add only salt and pepper.

But the meat is produced with materials — including fetal calf serum, used as a medium in which to grow the cells — that eventually would have to be replaced by similar materials of non-animal origin. And the burger was created at phenomenal cost — 250,000 euros, or about \$325,000, provided by a donor who so far has remained anonymous.

Large-scale manufacturing of cultured meat that could sit side-by-side with conventional meat in a supermarket and compete with it in price is at the very least a long way off. “This is still an early-stage technology,” said Neil Stephens, a social scientist at Cardiff University in Wales who has long studied the development of what is also sometimes referred to as “shmeat.” “There’s still a huge number of things they need to learn.”

There are also questions of safety — though Dr. Post and others say cultured meat should be as safe as, or safer than, conventional meat, and might even be made to be healthier — and of the consumer appeal of a product that may bear little resemblance to a thick, juicy steak.

“This is something very new,” Dr. Stephens said. “People need to wrestle with the idea of whether this is meat or not.”

Dr. Post is well aware of the obstacles. “I see the major hurdles, probably better than anybody else,” he said. “But you’ve got to have faith in technological advances, that they will be solved.”

And as with any technology, costs should eventually come down. “If it can be done more efficiently, there’s no reason why it can’t be cheaper,” he said. “It has to be done using the right materials, introducing recycling into the system, controlling labor through automation.”

Cultured meat would have some inherent cost advantages over conventional meat, said Hanna Tuomisto, whose research while at the University of Oxford in England was the basis for the *Environmental Science and Technology* study. “It’s really about the conversion of feed to meat,” she said. “In cultured meat production it’s much more efficient; only the meat is produced, and not all the other parts.”

Gabor Forgacs, a researcher at the University of Missouri and a founder of Modern Meadow, a start-up company that wants to develop and market cultured meat, is aware of the hurdles as well. "Getting cultured meat to the supermarket is going to be difficult, and controversial," said Dr. Forgacs, whose approach to cultured meat has some similarities to Dr. Post's, although he has also developed 3-D bioprinting technologies that might someday be used to create thicker tissues.

Given the difficulties, Modern Meadow is first focusing on creating cultured leather. Its process does not use stem cells but rather skin fibroblasts, specialized cells that produce collagen. "There are a lot of parallels to cultured meat, except that it is a lot less controversial because you're not going to eat it," Dr. Forgacs said. "But if we can convince the universe that we can build leather, it will be much easier to convince the universe that we can build meat."

In his work on cultured meat, Dr. Post uses a type of stem cell called a myosatellite cell, which the body itself uses to repair injured muscle tissue. The cells, which are found in a certain part of muscle tissue, are removed from the cow neck and put in containers with the growth medium.

Through much trial and error, the researchers have learned how best to get the cells to grow and divide, doubling repeatedly over about three weeks.

"But we need billions," said Anon van Essen, the technician in Dr. Post's lab.

The cells are then poured onto a small dab of gel in a plastic dish. The nutrients in the growth medium are greatly reduced, essentially starving the cells, which forces them to differentiate into muscle cells. "We use the cell's natural tendency to differentiate," Dr. Post said. "We don't do any magic."

Over time the differentiated cells merge to form primitive muscle fibers, called myotubes. "And then they just start to put on protein," Dr. Post said, and organize themselves into contractile elements. The key to this self-organization, he said, is that the cells are anchored in place (using a technique that he declined to disclose; earlier in his work he used Velcro).

"We add anchor points so they can attach to something and start to develop tension," he said. "That is by far the biggest driver of protein synthesis, and they do that by themselves."

The result is a tiny strip of tissue, about half an inch long and only 1/25th of an inch in diameter, that looks something like a short pink rice noodle, Dr. Post said.

The strips have to be thin because cells need to be close to a supply of nutrients to stay alive. One approach to making thicker tissues — to make a cultured steak rather than a hamburger, for instance — would require developing a network of channels, the equivalent of blood vessels, to bring nutrients to each cell. (A steak would also require culturing fat and incorporating it in the tissue, something Dr. Post has not had to do with his burger.)

Dr. Post said that one advantage of using myosatellite cells is that they differentiate easily. "The satellite cell is the ideal cell," he said. "You don't have to pull a lot of tricks to let it differentiate. I also think it's a practical advantage of keeping a lot of the stem cell production and quality control in the animal itself."

But others note that since there is a limit to how often myosatellite cells can reproduce, Dr. Post's cultured meat will never be completely animal-free; he will always need a supply of muscle tissue from which to obtain new cells.

Other researchers are studying different kinds of stem cells that, unlike myosatellite cells, can reproduce indefinitely, ensuring a "livestock-autonomous" supply of cells to make cultured meat.

Dutch researchers at Utrecht University are trying to isolate embryonic stem cells from pigs and cows. And Nicholas Genovese of the University of Missouri is trying to develop a type of stem cell that is "induced" from a regular adult cell. So a skin cell from a pig, perhaps, could be turned into a stem cell that could reproduce indefinitely and differentiate into muscle tissue to create cultured pork.

But Dr. Post said that efforts to use different kinds of stem cells introduced other problems. And even if his approach means the world will still need cattle, it will need far fewer of them. "If we can reduce the global herd a millionfold, then I'm happy," he said. "I don't need to reduce it a billionfold."

Anyway, he said, "a lot of the technologies in the process we are currently using eventually have to be changed, if not all of them.

"That's not the point of the proof of concept," Dr. Post said. "The point is, we already have sufficient technology to make a product that we could call meat or cultured beef, and we can eat it and we survive."

"I'm not by nature a very passionate guy," he added. "But I feel strongly that this could have a major impact on society in general. And that's a big motivator."

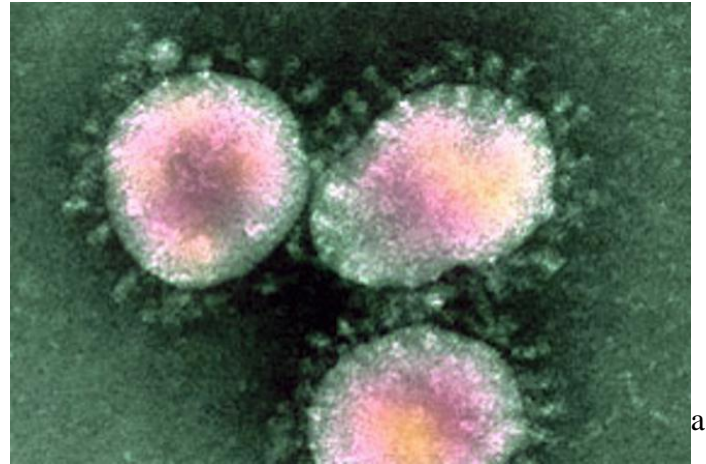
<http://www.wired.com/wiredscience/2013/05/coronavirus-france-saudi/>

More On The New Coronavirus: Cases in France, The WHO In Saudi Arabia

There's additional news today which is both heartening and a little concerning too.

• By [Maryn McKenna](#)

My last [two posts](#) looked at the problems that might be caused by hospital spread of the new coronavirus, based on what happened during the early days of SARS 10 years ago. Hospital spread of this new virus is a real concern; it was first identified, retrospectively, in an outbreak in a hospital in Jordan a year ago, and international concern really picked up after the acknowledgement of a current outbreak in the Al-Ahsa region of Saudi Arabia. Now it appears there is a third instance of hospital spread, in France. Several days ago the [French Ministry of Health announced](#) a single case, Frenchman who had traveled to Dubai and may have



been infected there. This morning, there is news of a second case, a person who shared a hospital room with the first patient. Here's the [announcement from the French Ministry](#) and [one from the World Health Organization](#). (And if you read French, I [talk to the French newspaper Le Figaro](#) about it here.) Simultaneously, the WHO has announced that [two more patients have been recognized](#) in that Saudi hospital cluster. That makes 15 patients (three of whom died) in that cluster, and 34 patients (18 deaths) worldwide.

There's additional news today as well, which is both heartening and a little concerning too.

The WHO announced that its assistant director-general Dr. Keiji Fukuda held a press conference in Riyadh in Saudi Arabia about this emerging disease, and released the text of his statement there. This is good news because it is a sign that Saudi Arabia must be becoming more open to the involvement of international authorities (something which my contacts have told me they are worried about); in fact, toward the end of the statement, he makes a diplomatic point of praising the Kingdom's public-health response to the outbreak. At the same time, it is notable what the WHO and other health authorities, including the US Centers for Disease Control and Prevention, still do not know about this virus — which Fukuda makes a point of emphasizing as well.

Here is the full text of his statement. (The WHO sent it out by email; I'll add a link to their site when I find it [here it is](#) on their site.)

WHO Press Statement Related to the Novel Coronavirus Situation

12 May 2013

The emergence of this new coronavirus is globally recognized as an important and major challenge for all of the countries which have been affected as well as the rest of the world. The Ministry of Health of the Kingdom of Saudi Arabia has recognized this and invited the World Health Organization (WHO) to help them assess the situation and to provide guidance and recommendations. WHO is pleased to be here to work together with the Kingdom of Saudi Arabia. At this time there are some things about this new disease we understand. However I would like to remind everyone that this is a new infection and there are also many gaps in our knowledge that will inevitably take time to fill in.

We know that the disease is caused by a virus from a group called coronaviruses. One member of the coronavirus family is the SARS virus. This new virus is NOT the SARS virus. They are distinct from each other. However, the fact that they are related has added to the world's concern. We know this virus has infected people since 2012, but we don't know where this virus lives. We know that when people get infected, many of them develop severe pneumonia. What we don't know is how often people might develop mild disease. We also know that most of the persons who have been infected so far have been older men, often with other medical conditions. We are not sure why we are seeing this pattern and if it will change over time.

There are many other things that we don't understand. For example, how are people getting infected? Is it from animals? Is it from contaminated surfaces? Is it from other people? Finally, we don't know how widespread is this virus, both in this region and in other countries.

The greatest global concern, however, is about the potential for this new virus to spread. This is partly because the virus has already caused severe disease in multiple countries, although in small numbers, and has persisted in the region since 2012. Of most concern, however, is the fact that the different clusters seen in multiple countries increasingly support the hypothesis that when there is close contact this novel coronavirus can transmit from person-to-person. This pattern of person-to-person transmission has remained limited to some small clusters and so far, there is no evidence that this virus has the capacity to sustain generalized transmission in communities.

At this point, several urgent actions are needed. The most important ones are the need for countries, both inside and outside of the region, to increase their levels of awareness among all people but especially among staff working in their

health systems and to increase their levels of surveillance about this new infection. In Saudi Arabia, we have seen the importance of better surveillance. When new cases are found, as is likely, it is critical for countries to report these cases and related information urgently to WHO as required by the International Health Regulations because this is the basis for effective international alertness, preparedness and response. Countries also need to assess their level of preparedness and readiness if this virus should spread and to intensify strengthening the core capacities identified in the International Health Regulations if they are not adequate. WHO is ready to assist countries in this region and globally in these tasks.

There are also some questions that urgently need to be answered including how are people are getting infected, and what are the main risk factors for either infection or development of severe disease. The answers to these questions hold the keys to preventing infection.

In closing, we want to note that the Government of Saudi Arabia has taken the novel coronavirus situation very seriously. The Ministry of Health has initiated crucial public health actions — including intensifying surveillance, initiating investigations and important research and putting control measures in place.

One of the reasons why more cases have been identified in KSA may be because they have gone ahead to strengthen their surveillance system and lab capacities and network.