http://www.eurekalert.org/pub_releases/2013-04/uoo-oun042913.php

Feast clue to smell of ancient earth

Tiny 1,900 million-year-old fossils from rocks around Lake Superior, Canada, give the first ever snapshot of organisms eating each other and suggest what the ancient Earth would have smelled like.

The fossils, preserved in Gunflint chert, capture ancient microbes in the act of feasting on a cyanobacterium-like fossil called Gunflintia – with the perforated sheaths of Gunflintia being the discarded leftovers of this early meal.

A team, led by Dr David Wacey of the University of Western Australia and Bergen University, Norway, and Professor Martin Brasier of Oxford University, reports in this week's Proceedings of the National Academy of Sciences the fossil evidence for how this type of feeding on organic matter – called 'heterotrophy' – was taking place. They also show that the ancient microbes appeared to prefer to snack on Gunflintia as a 'tasty morsel' in preference to another bacterium (Huroniospora).

'What we call 'heterotrophy' is the same thing we do after dinner as the bacteria in our gut break down organic matter,' said Professor Martin Brasier of Oxford University's Department of Earth Sciences, an author of the paper. 'Whilst there is chemical evidence suggesting that this mode of feeding dates back 3,500 million years, in this study for the first time we identify how it was happening and 'who was eating who'. In fact we've all experienced modern bacteria feeding in this way as that's where that 'rotten egg' whiff of hydrogen sulfide comes from in a blocked drain. So, rather surprisingly, we can say that life on earth 1,900 million years ago would have smelled a lot like rotten eggs.'

The team analysed the microscopic fossils, ranging from about 3-15 microns in diameter, using a battery of new techniques and found that one species – a tubular form thought to be the outer sheath of Gunflintia – was more perforated after death than other kinds, consistent with them having been eaten by bacteria.

In some places many of the tiny fossils had been partially or entirely replaced with iron sulfide ('fool's gold') a waste product of heterotrophic sulfate-reducing bacteria that is also a highly visible marker. The team also found that these Gunflintia fossils carried clusters of even smaller (c.1 micron) spherical and rod-shaped bacteria that were seemingly in the process of consuming their hosts.

Dr Wacey said that: 'recent geochemical analyses have shown that the sulfur-based activities of bacteria can likely be traced back to 3,500 million years or so – a finding reported by our group in Nature Geoscience in 2011. Whilst the Gunflint fossils are only about half as old, they confirm that such bacteria were indeed flourishing by 1,900 million years ago. And that they were also highly particular about what they chose to eat.'

http://www.eurekalert.org/pub_releases/2013-04/s-wgt042913.php

Will green tea help you lose weight?

Evidence shows that green tea extract in tandem with an additional compound could be effective for body weight control and type 2 diabetes

Evidence has shown that green tea extract may be an effective herbal remedy useful for weight control and helping to regulate glucose in type 2 diabetes. In order to ascertain whether green tea truly has this potential, Jae-Hyung Park and his colleagues from the Keimyung University School of Medicine in the Republic of Korea conducted a study, now published in the Springer journal Naunyn-Schmiedeberg's Archives of Pharmacology.

The active constituents of green tea, which have been shown to inhibit intestinal glucose and lipid uptake, are a certain type of flavonoid called gallated catechins. The authors had previously suggested that the amount of gallated catechins necessary to reduce blood glucose concentrations can be achieved from a daily dose of green tea. However, the amount of green tea needed to decrease lipid uptake from the gut is higher and has been shown to have adverse effects in humans. Once in the bloodstream, gallated catechins can actually increase insulin resistance, which is a negative consequence especially in obese and diabetic patients.

For their study, the researchers tested the effects of green tea extract on body weight and glucose intolerance in both diabetic mice and normal mice fed a high-fat diet. To prevent a high dose of gallated catechins from reaching the bloodstream, the authors also used a non-toxic resin, polyethylene glycol, to bind the gallated catechins in the gut to prevent their absorption. They then looked at the effects on the mice of eating green tea extract alone, and eating green tea extract plus polyethylene glycol. They compared these against the effects of two other therapeutic drugs routinely prescribed for type 2 diabetes.

Results showed that green tea extract in isolation did not give any improvements in body weight and glucose intolerance. However, when green tea extract was given with polyethylene glycol, there was a significant reduction in body weight gain, insulin resistance and glucose intolerance in both normal mice on a high fat diet and diabetic mice. The polyethylene glycol had the effect of prolonging the amount of time the gallated catechins remained in the intestines, thereby limiting glucose absorption for a longer period.

Interestingly, the effects of the green tea extract in both the intestines and in the circulation were measurable at doses which could be achieved by drinking green tea on a daily basis. In addition, the effects of green tea extract w ere comparable to those found when taking two of the drugs which are currently recommended for non-insulin dependent diabetes.
The authors conclude that "dietary green tea extract and polyethylene glycol alleviated body weight gain and insulin resistance in diabetic and high-fat mice, thus ameliorating glucose intolerance. Therefore the green tea extract and polyethylene glycol complex may be a preventative and therapeutic tool for obesity and obesity-related type 2 diabetes without too much concern about side effects."
Reference: Park, Jae-Hyung et al. (2013). Green tea extract with polyethylene glycol-3350 reduces body weight and improves glucose tolerance in db/db and high-fat diet mice. Naunyn-Schmiedeberg's Archives of Pharmacology. DOI 10.1007/s00210-013-0869-9

http://www.eurekalert.org/pub_releases/2013-04/tes-qbs042613.php

Gastric bypass surgery alters hormones to relieve diabetes symptoms

Study is among first to compare post-operative to simulated pre-operative digestion

Chevy Chase, MD - Gastric bypass surgery alters the hormones and amino acids produced during digestion, hinting at the mechanisms through which the surgery eliminates symptoms of type 2 diabetes, according to a recent study accepted for publication in The Endocrine Society's Journal of Clinical Endocrinology & Metabolism (JCEM).
The study simulated pre-operative digestion and compare how the same patient metabolizes nutrients following surgery. In four patients who had catheters inserted into the bypassed portion of the stomach as part of their post-operative care, researchers analyzed the hormones produced when food traveled through the catheter to mimic the pre-operative digestive tract. Researchers compared those findings to the hormonal activity when a meal was digested through the new bypassed route.
Patients' levels of insulin and the hormones glucose-dependent insulinotropic peptide (GIP) and glucagon-like peptide-1 (GLP-1) soared following a meal digested through the new bypassed digestive tract. Branched-chain amino acids also rose, while free fatty acid levels dropped following gastric bypass surgery. This hormonal activity, particularly spikes in insulin, allowed patients to digest the meal while maintaining better control of their blood sugar.
"The data offer insights into how gastric bypass surgery works. The surgery is currently the most effective weapon we have to combat morbid obesity and, as a side effect, it has proven to relieve symptoms of type 2 diabetes," said the study's main author, Nils Wierup, PhD, associate professor at the Lund University Diabetes Centre in Sweden. "Exploring the impact this surgery has on digestion could yield new, non-surgical strategies for treating diabetes and obesity."
Researchers analyzed digestion in four female patients who underwent gastric bypass surgery at two Swedish hospitals and had received stomach catheters as part of their post-operative care.
"Unlike past studies that compared digestion before and after surgery, our method eliminated concerns that differences in weight and food intake following the surgery could influence the analysis," Wierup said. "Using this strategy, we were able to prevent confounding factors from affecting the data."
Other researchers working on the study include: A. Lindqvist, P. Spégel, M. Ekelund, H. Mulder, L. Groop and J. Hedenbro of Lund University.
The article, "Effects of Ingestion Routes on Hormonal and Metabolic Profiles in Gastric-Bypassed Humans," appears in the May 2013 issue of JCEM.

http://www.sciencedaily.com/releases/2013/04/130429164950.htm

How We Decode 'Noisy' Language in Daily Life: How People Rationally Interpret Linguistic Input

A new study shows how people rationally interpret linguistic input

Suppose you hear someone say, "The man gave the ice cream the child." Does that sentence seem plausible? Or do you assume it is missing a word? Such as: "The man gave the ice cream to the child."
A new study by MIT researchers indicates that when we process language, we often make these kinds of mental edits. Moreover, it suggests that we seem to use specific strategies for making sense of confusing information -- the "noise" interfering with the signal conveyed in language, as researchers think of it.
"Even at the sentence level of language, there is a potential loss of information over a noisy channel," says Edward Gibson, a professor in MIT's Department of Brain and Cognitive Sciences (BCS) and Department of Linguistics and Philosophy.

Gibson and two co-authors detail the strategies at work in a new paper, "Rational integration of noisy evidence and prior semantic expectations in sentence interpretation," published today in the Proceedings of the National Academy of Sciences.
"As people are perceiving language in everyday life, they're proofreading, or proof-hearing, what they're getting," says Leon Bergen, a PhD student in BCS and a co-author of the study. "What we're getting is quantitative evidence about how exactly people are doing this proofreading. It's a well-calibrated process."

Asymmetrical strategies

The paper is based on a series of experiments the researchers conducted, using the Amazon Mechanical Turk survey system, in which subjects were presented with a series of sentences -- some evidently sensible, and others less so -- and asked to judge what those sentences meant.
A key finding is that given a sentence with only one apparent problem, people are more likely to think something is amiss than when presented with a sentence where two edits may be needed. In the latter case, people seem to assume instead that the sentence is not more thoroughly flawed, but has an alternate meaning entirely.
"The more deletions and the more insertions you make, the less likely it will be you infer that they meant something else," Gibson says. When readers have to make one such change to a sentence, as in the ice cream example above, they think the original version was correct about 50 percent of the time. But when people have to make two changes, they think the sentence is correct even more often, about 97 percent of the time.
Thus the sentence, "Onto the cat jumped a table," which might seem to make no sense, can be made plausible with two changes -- one deletion and one insertion -- so that it reads, "The cat jumped onto a table." And yet, almost all the time, people will not infer that those changes are needed, and assume the literal, surreal meaning is the one intended.
This finding interacts with another one from the study, that there is a systematic asymmetry between insertions and deletions on the part of listeners. "People are much more likely to infer an alternative meaning based on a possible deletion than on a possible insertion," Gibson says.
Suppose you hear or read a sentence that says, "The businessman benefitted the tax law." Most people, it seems, will assume that sentence has a word missing from it -- "from," in this case -- and fix the sentence so that it now reads, "The businessman benefitted from the tax law." But people will less often think sentences containing an extra word, such as "The tax law benefitted from the businessman," are incorrect, implausible as they may seem.
Another strategy people use, the researchers found, is that when presented with an increasing proportion of seemingly nonsensical sentences, they actually infer lower amounts of "noise" in the language. That means people adapt when processing language: If every sentence in a longer sequence seems silly, people are reluctant to think all the statements must be wrong, and hunt for a meaning in those sentences. By contrast, they perceive greater amounts of noise when only the occasional sentence seems obviously wrong, because the mistakes so clearly stand out.
"People seem to be taking into account statistical information about the input that they're receiving to figure out what kinds of mistakes are most likely in different environments," Bergen says.

Reverse-engineering the message

Other scholars say the work helps illuminate the strategies people may use when they interpret language.
"I'm excited about the paper," says Roger Levy, a professor of linguistics at the University of California at San Diego who has done his own studies in the area of noise and language.
According to Levy, the paper posits "an elegant set of principles" explaining how humans edit the language they receive. "People are trying to reverse-engineer what the message is, to make sense of what they've heard or read," Levy says. "Our sentence-comprehension mechanism is always involved in error correction, and most of the time we don't even notice it," he adds. "Otherwise, we wouldn't be able to operate effectively in the world. We'd get messed up every time anybody makes a mistake."
The study was supported by a grant from the National Science Foundation.

http://scitechdaily.com/natural-dental-wear-protects-teeth-against-fatigue-failure/

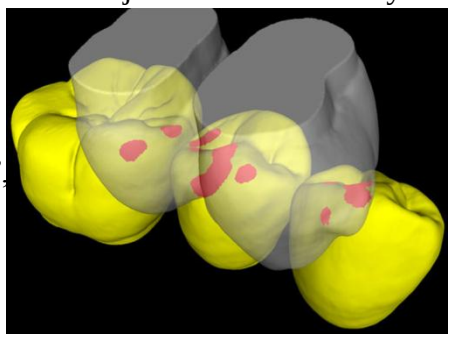
Natural Dental Wear Protects Teeth Against Fatigue Failure

In a newly published study, researchers analyzed modern human teeth, finding that material loss protects teeth against fatigue failure.

April 29, 2013 by Staff

Scientists of the Max Planck Institute for Evolutionary Anthropology in Leipzig and the Senckenberg Research Institute in Frankfurt together with dental technicians have digitally analyzed modern human teeth using an engineering approach, finite element method, to evaluate the biomechanical behavior of teeth under realistic loading. They report results, showing that very widespread loss of dental material (enamel and dentine) at the

base of the crown might be linked to the reduction of tooth wear in our industrialized societies. The study is published in the professional journal PLoS ONE.
Our teeth are important and expensive for us. In this respect aesthetic aspects are of major interest. A healthy dentition should show shiny white tooth crowns and possibly no occlusal wear. The evolutionary history of our dentition teaches us something different. Natural tooth wear as an inevitable consequence of chewing food and habitat accompanying human evolution since ancient times.
"In our industrialized societies we find an increase in dental cervical defects", explains Ottmar Kullmer of the Senckenberg Research Institute: "Based on the results of our simulations of chewing loads, we assume that much of the enamel failure we find today frequently in tooth crowns is probably caused by cyclic tensile stresses during chewing."



Collision detection (red areas) between the lower right premolars and first molar and the upper right premolars.
Credit: Senckenberg

The researchers used methods from engineering science (Finite Element Analysis, FEA), after applying a new Software tool (Occlusal Fingerprint Analyzer) developed in the Senckenberg Research Institute to precisely determine tooth to tooth contacts. "The computer simulation of chewing forces creates high tensile stresses exactly in the cervical areas where we frequently find tooth lesions in our teeth", reconsiders Stefano Benazzi of the Max Plank Institute for Evolutionary Anthropology in Leipzig, who carried out the Finite Element Analysis. To investigate changes in the stress pattern in the same tooth crowns with varying tooth wear ages, two premolars were artificially abraded in the laboratory, based on their individual data of occlusal movement. So, it was possible to calculate the changes in the stress pattern, depending on the wear stage.
The stress in the teeth with advanced wear shows a far better distribution of the loads over the whole tooth crown, so that the tensile stresses will be remarkably reduced. "Evolutionary factors have apparently led to a quite successful compromise between material loss and longest possible preservation of function", says Benazzi. The extension of the lifespan and the quick changes in our lifestyle with a remarkable reduction in tooth wear present a major challenge for modern dentistry, say the scientists.
Publication: Benazzi S, Nguyen HN, Schulz D, Grosse IR, Gruppioni G, et al. (2013) "The Evolutionary Paradox of Tooth Wear: Simply Destruction or Inevitable Adaptation?" PLoS ONE 8(4): e62263. doi:10.1371/journal.pone.0062263
Source: Max Planck Institute

http://www.eurekalert.org/pub_releases/2013-04/uoc--iaa042613.php

Is antimatter anti-gravity?

First direct measurement of antimatter's weight compared to that of normal matter

Antimatter is strange stuff. It has the opposite electrical charge to normal matter and, when it meets its matter counterpart, the two annihilate in a flash of light.
Four University of California, Berkeley, physicists are now asking whether matter and antimatter are also affected differently by gravity. Could antimatter fall upward – that is, exhibit anti-gravity – or fall downward at a different rate than normal matter?
Almost everyone, including the physicists, thinks that antimatter will likely fall at the same rate as normal matter, but no one has ever dropped antimatter to see if this is true, said Joel Fajans, UC Berkeley professor of physics. And while there are many indirect indications that matter and antimatter weigh the same, they all rely on assumptions that might not be correct. A few theorists have argued that some cosmological conundrums, such as why there is more matter than antimatter in the universe, could be explained if antimatter did fall upward.
In a new paper published online on April 30 in Nature Communications, the UC Berkeley physicists and their colleagues with the ALPHA experiment at CERN, the European Organization for Nuclear Research in Geneva, Switzerland, report the first direct measurement of gravity's effect on antimatter, specifically antihydrogen in free fall. Though far from definitive – the uncertainty is about 100 times the expected measurement – the UC Berkeley experiment points the way toward a definitive answer to the fundamental question of whether matter falls up or down.
"This is the first word, not the last," Fajans. "We've taken the first steps toward a direct experimental test of questions physicists and nonphysicists have been wondering about for more than 50 years. We certainly expect antimatter to fall down, but just maybe we will be surprised."
Fajans and fellow physics professor Jonathan Wurtele employed data from the Antihydrogen Laser Physics Apparatus (ALPHA) at CERN. The experiment captures antiprotons and combines them with antielectons

(positrons) to make antihydrogen atoms, which are stored and studied for a few seconds in a magnetic trap. Afterward, however, the trap is turned off and the atoms fall out. The two researchers realized that by analyzing how antihydrogen fell out of the trap, they could determine if gravity pulled on antihydrogen differently than on hydrogen.

Antihydrogen did not behave weirdly, so they calculated that it cannot be more than 110 times heavier than hydrogen. If antimatter is anti-gravity – and they cannot rule it out – it doesn't accelerate upward with more than 65 Gs.

"We need to do better, and we hope to do so in the next few years," Wurtele said. ALPHA is being upgraded and should provide more precise data once the experiment reopens in 2014.

The paper was coauthored by other members of the ALPHA team, including UC Berkeley postdoctoral fellow Andre Zhmoginov and lecturer Andrew Charman.

http://www.sciencedaily.com/releases/2013/04/130429175904.htm

Connection Between Inflammatory Stimulus and Parkinson's Disease Examined

Exposure of an experimental inflammatory agent in an animal model causes changes in brain tissue similar to those associated with the development of Parkinson's disease

Parkinson's disease (PD) is a progressive degenerative disease affecting a person's ability to coordinate and control their muscle movement. What starts out as a tremor in a finger will eventually lead to difficulty in writing and speaking, and ultimately the inability to walk without assistance. Since the 1950s research has shown that people with Parkinson's have decreased levels of the chemical dopamine in their brains, which is involved in sending messages to the part of the brain that controls coordination and movement. Subsequent research has found that dopamine-generating cells, known as dopaminergic neurons, are also absent in a specific area of the brain in those with PD.

The precise cause or causes of PD is unknown, but there is a consensus that an inflammatory event or episode is involved in the initiation of neurodegeneration, and that chronic neuroinflammation is a sustaining and exacerbating reason for the loss of the dopaminergic neurons. A new study conducted by a team of Texas researchers brings the understanding of inflammation's role a step further. They have found that a single, high-dose exposure of an experimental inflammatory agent in an animal model causes changes in brain tissue that are similar to those associated with the development of the disease.

The study was conducted by Roger Bick and his colleagues Marie-Francoise Doursout, Michael S. Schurdell, Lauren M. Young, Uzondu Osuagwu, Diana M. Hook, Brian J. Poindexter, Mya C. Schiess, and Diane L. M. Bick, all at The University of Texas Health Science Center at Houston (UTHealth), Houston, Tex. Dr. Schiess presented the team's findings at last week's Experimental Biology 2013 meeting, held at the Boston Convention and Exhibition Center, Boston, Mass. Their poster presentation was entitled, "Inflammatory cells and cytokines in the olfactory bulb of a rat model of neuroinflammation; Insights into neurodegeneration?" The full study will appear in an upcoming edition of the Journal of Interferon & Cytokine Research.

Methodology

In the study, the researchers examined inflammatory cell and cytokine production in brain tissue from a lipopolysaccharide (LPS)-treated rat model that mimics many of the neuropathologic changes associated with PD. Concurrently, they monitored the appearance of glial cell line-derived neurotrophic factor (GDNF), a neuronal protective agent, and circulating nitric oxide (NO) levels. They also examined the immune system associated cells in the olfactory bulb of the brain. It is known that Parkinson's starts with this mechanism. Twelve male Sprague-Dawley rats were treated with intravenous LPS in saline, 12 control rats were treated with saline, and all were maintained for up to 48 hours before euthanasia and brain removal. Brains were removed from both groups at defined times, blood and other tests were conducted, and images of various sections of the brain, including the olfactory bulb, cortex and cerebellum, were taken using fluorescent microscopy.

Results and Conclusions

In general, the researchers found that a single injection of LPS elicited a systemic inflammatory response in the rats, as indicated by an elevation in certain circulatory cytokines. Tissue taken from the olfactory bulb showed the presence of immune associated cells. Individual cytokines within the olfactory bulb showed an increase in certain types of cytokines. Taken together, the complete analysis indicated that the single dose of LPS stimulated an inflammatory response that closely resembled the hallmarks of the development of the disease. The results suggest an involvement of both the peripheral and the central nervous system immune components in response to inflammation and inflammatory episodes.

As a result, the researchers suggest:

(1) inflammation initiates an immune response;

(2) the presence of continuing and increasing pro-inflammatory mechanisms results in a process whereby cellular protective mechanisms are overcome and the more susceptible cells, such as the dopaminergic neurons, enter into cell death pathways; and

(3) this leads to a series of events that are a key part of the progression of PD.

Next Steps

Neuroinflammation is a significant problem for those with PD, and it persists throughout the course of this debilitating illness. Understanding of the essential processes behind it is the best pathway to finding therapeutic approaches to address it. This study highlights an opportunity to better understand the role inflammation plays in the process. *American Physiological Society (APS) (1970, January 1). Connection between inflammatory stimulus and Parkinson's disease examined. ScienceDaily. Retrieved May 6, 2013, from http://www.sciencedaily.com-/releases/2013/04/130429175904.htm*

http://www.sciencedaily.com/releases/2013/04/130430092325.htm

Lake Found in Sierra Nevada With the Oldest Remains of Atmospheric Contamination in Southern Europe

A team of scientists find in the Laguna de Rio Seco lagoon, at an altitude of 3,020 m., evidence of atmospheric pollution caused by lead and linked to metallurgical activities from 3,900 years ago (Early Bronze Age).

Lead pollution increased gradually during the Late Bronze Age and Early Iron Age, coinciding with the development and expansion of metallurgy in southern Europe.

Atmospheric contamination due to heavy metals is currently a severe problem of global proportions, with important repercussions in public health. This type of pollution also occurred in prehistoric times.

Influence of humans on the environment

The article reveals the influence of human activity on the environment due to the beginnings of metallurgy at the end of the Holocene period in southern Europe. From the geochemical analyses carried out on the sediments deposited during the past 10,000 years in the Laguna de Rio Seco lagoon, a remote alpine lake in Sierra Nevada, at 3,020 m. above sea level, evidence has been found of atmospheric pollution from lead. This contamination is traced back to metallurgical activities from 3,900 years ago (Early Bronze Age), coinciding with an increase in forest fires and deforestation in southern Europe.

La Laguna de Rio Seco lagoon, inn Sierra Nevada (Granada), where the researchers carried out the sounding and recovered the samples, using boats to do so. The lagoon is at an altitude of 3,020 m. and has recently registered the evolution of atmospheric pollution from Neolithic times up to the present day and which, therefore, offer trails of the activities carried out by each of the peoples that have inhabited southern Spain: Phoenicians, Romans, Visigoths, Moslems, etc. **(Credit: Image courtesy of University of Granada)**

As the University of Granada researcher, Jose Antonio Lozano Rodriguez explains, "this data tells us of the great influence our ancestors had on the environment. Lead pollution gradually increased during the Late Bronze Age and the Early Iron Age, coinciding with the development and expansion of metallurgy in southern Europe." The samples studied show a maximum contamination from lead about 2,900 years ago, which would imply an intense movement and manipulation of this metal in the area around Sierra Nevada.

Contamination during the Roman Empire

In the samples studied by the scientists, there are also high levels of atmospheric contamination from lead during the Roman Empire, when large quantities of this metal were extracted in the south of the Iberian Peninsula, as well as during the past 300 years, coinciding with the Industrial Revolution and the reactivation of mining activity in southern Spain.

A curious detail also shown by the study is a reduction in atmospheric pollution from lead during the last few decades, which, as Lozano concludes, "suggests that the global measures taken to reduce lead emissions, such as the use of lead-free gasoline, have helped to reduce the levels of this metal in the atmosphere."

A. García-Alix, F.J. Jimenez-Espejo, J.A. Lozano, G. Jiménez-Moreno, F. Martinez-Ruiz, L. García Sanjuán, G. Aranda Jiménez, E. García Alfonso, G. Ruiz-Puertas, R. Scott Anderson. Anthropogenic impact and lead pollution throughout the Holocene in Southern Iberia. Science of The Total Environment, 2013; 449: 451 DOI: 10.1016/j.scitotenv.2013.01.081

http://bit.ly/119GSDQ

Bees need honey's natural pharmaceuticals

Ingredients trigger insects' genes for detoxification and immune defenses

By Susan Milius

Honey is more than a sweet treat to bees. It turns out that it doses honeybees with certain compounds that switch on their detox defenses. Instead of relying on their own honey for food during the winter, today's commercially kept honeybees often get fed sugar substitutes and protein supplements. The sugar sources such as high-fructose corn syrup may be missing something helpful, however. New tests find compounds in honey that trigger surges of activity in genes needed for detoxifying chemicals or for making antimicrobial agents, researchers report April 29 in the *Proceedings of the National Academy of Sciences.*

Undisturbed by beekeepers, adult bees would sip flower nectar to keep themselves going and collect pollen to squish into a softened paste to feed to their young. They make honey from extra nectar and store it to eat during tough times without fresh flowers. In that honey, the most effective trigger for detox genes is *p*-coumaric acid, report entomologist May Berenbaum and her colleagues at the University of Illinois at Urbana-Champaign. It's a building block of the coatings for pollen grains.

Honeybees these days have plenty to detoxify; 121 pesticides and their breakdown products showed up in a 2010 survey of honeybees and their hives in 23 states and one Canadian province.

Relentless exposure to pesticides on crops and to antimite treatment in their own hives ranks among the major suspects contributing to bees' precarious health in the United States. Winter losses have been large in recent years, including those from colony collapse disorder, the puzzling disappearance of worker bees.

Knowing that honey's *p*-coumaric acid activates detox genes, Berenbaum says, "it might be helpful to reexamine the adequacy of the artificial bee diets." Some of these honey substitutes went into use decades ago when bees didn't face the challenges they do today.

The connection between pollen and enhanced defenses fits with what bee specialists have noticed in the field, says Dennis vanEngelsdorp of the University of Maryland in College Park. When rain or drought shrinks bees' pollen haul in the fall, colonies don't survive as well during the winter.

Studies have shown that pollen from diverse flowers makes for a better diet for bees than the artificial diets people provide, says Jeff Pettis of the U.S. Department of Agriculture's Bee Research Laboratory in Beltsville, Md. Says Pettis, who was not involved in the new study: "We need better forage opportunities for all pollinators."

Scientists are just learning about the honeybees' detox system. The honeybee has only about a third to half as many detox genes as many other insects do. That puzzles Berenbaum since honeybees collect pollen and nectar from plants throughout the year, exposing them to many different compounds.

Also, work now shows that honeybee detox genes may not follow the usual pattern of turning on when something to detoxify appears, Berenbaum says. Exposing bees to a drug compound in a standard lab test had no effect. Instead, the big cue for the genes may be the pollen compound. It's not a bad choice, she says, since it's in everything they would naturally eat. Berenbaum warns against premature bee dosing from these initial results. "I do want to make sure that beekeepers don't immediately run out and start mixing *p*-coumaric acid with their high-fructose corn syrup," she says. At this early stage, she doesn't know whether giving the bees the wrong dose could actually harm them.

W. Mao, M.A. Schuler and M.R. Berenbaum. Honey constituents up-regulate detoxification and immunity genes in the western honey bee Apis mellifera. Proceedings of the National Academy of Sciences. Posted April 29, 2013. doi: 10.1073/pnas.1303884110.

http://www.sciencedaily.com/releases/2013/04/130430131538.htm

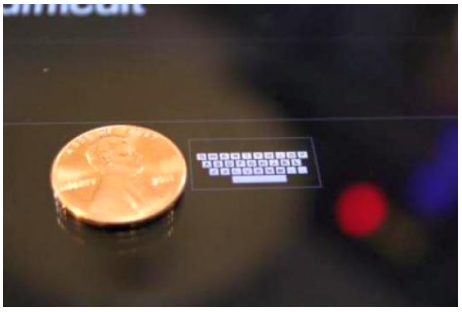
New Zooming Technique for Entering Text Into Smartwatches

As devices get smaller, how will users enter data into them

Technology blogs have been abuzz that smartwatches may soon be on their way from companies such as Apple, Google, Samsung and Microsoft. But as capable as these ultra-small computers may be, how will users enter an address, a name, or a search term into them? One solution is an iterative zooming technique developed and tested by researchers at Carnegie Mellon University.

Called ZoomBoard, this text entry technique is based on the familiar QWERTY keyboard layout. Though the full keyboard is impossibly small on a watch-size display, simply tapping the screen once or twice will enlarge an individual key until it can be comfortably and accurately pressed.

Capital letters can be typed by momentarily holding a key. A swipe to the left deletes a character. A swipe to the right types a space. An upward swipe calls up a secondary keyboard of numbers and other symbols.



"You aren't going to write a novel, but it gets the job done," said Stephen Oney, a Ph.D. student in the Human-Computer Interaction Institute (HCII). "This opens up new possibilities for devices such as smartwatches, which generally lack any means of entering text, as many aren't powerful enough for voice recognition."

"Users can enter about 10 words per minute at high accuracy on a keyboard the size of a penny," said Chris Harrison, a Ph.D. candidate who will soon join the HCII faculty. "That's plenty fast enough to dial a phone number, or enter 'where is pizza?' or get 'directions home.'"

ZoomBoard, a method for entering text into a smartwatch or other ultra-small computer, is based on the traditional QWERTY keyboard. Iteratively touching the screen causes individual keys to grow large enough to be pressed accurately. **(Credit: Carnegie Mellon University)**

Oney and Harrison developed and evaluated ZoomBoard with fellow HCII students Amy Ogan and Jason Wiese. They will present their findings May 1 at CHI 2013, the Conference on Human Factors in Computing Systems, in Paris, where the research was awarded an honorable mention for Best Paper.

"A lot of people are banking on voice for text entry on very small devices, and no doubt voice will play an increasingly central role," Harrison said. "But sometimes you need to enter something discretely and without a big fuss; for that, ZoomBoard is great."

Other approaches to text input on small devices have included new keyboard layouts and gesture-based characters. But the HCII team opted to use the conventional QWERTY keyboard because the configuration is instantly familiar to users.

Further development of ZoomBoard might include a language model, a standard feature on most soft keyboards that suggests possible words based on the first few letters typed; for ZoomBoard, this might also involve adjusting the centering point of the first zoom step over a predicted letter.

The researchers say ZoomBoard also could be useful on larger keyboards for people who have movement disorders that make typing difficult or for people who are using their keyboards while jogging.

A video demonstration and other material is available at the project website, http://www.chrisharrison.net/index.php/Research/Zoomboard.

http://www.eurekalert.org/pub_releases/2013-05/uab-bmp042513.php

Breast milk protein complex helps reverse antibiotic resistance

Using a protein complex found in breast milk, researchers force drug-resistant 'superbugs' including MRSA to respond to antibiotics again

BUFFALO, N.Y. - A protein complex found in human breast milk can help reverse the antibiotic resistance of bacterial species that cause dangerous pneumonia and staph infections, according to new University at Buffalo research.

In petri dish and animal experiments, the protein complex - called Human Alpha-lactalbumin Made Lethal to Tumor Cells (HAMLET) - increased bacteria's sensitivity to multiple classes of antibiotics, such as penicillin and erythromycin. The effect was so pronounced that bacteria including penicillin-resistant Streptococcus pneumoniae and methicillin-resistant Staphylococcus aureus (MRSA) regained sensitivity to the antibiotics they were previously able to beat, said researchers Anders Hakansson, PhD, Laura Marks, and Hazeline Hakansson, PhD, all in UB's Department of Microbiology and Immunology.

HAMLET's effects against S. pneumoniae were published in the journal PLOS ONE in August 2012 with Marks, Anders Hakansson and UB PhD student Emily Clementi as authors. HAMLET's effects on S. aureus will appear in PLOS ONE on May 1 at 5 p.m., and this press release is embargoed until that time. A graphic to illustrate this story is available at http://ubnews.smugmug.com/2013/hamlet-protein/.

"HAMLET has the potential minimize the concentrations of antibiotics we need to use to fight infections, and enable us to use well-established antibiotics against resistant strains again," said Anders Hakansson, lead researcher and a UB assistant professor of microbiology and immunology who has long been interested in the protective effect of breast-feeding against infections.

The findings hold great promise in an era when hospitals are struggling to contain drug-resistant "superbugs" like MRSA, the culprit behind lethal hospital-acquired staph infections. Bacteria seem to have difficulty developing resistance to HAMLET, dying in huge numbers even after being exposed to HAMLET for many generations.

Marks, an MD/PhD student in the UB School of Medicine and Biomedical Sciences' Medical Scientist Training Program, described another of HAMLET's benefits: "Unlike synthetic drugs, HAMLET is a naturally occurring

human milk protein-lipid complex, and so is not associated with the types of toxic side effects that we so frequently see with the high-powered antibiotics needed to kill drug-resistant organisms."
The idea to test HAMLET in combination with other antibiotics was inspired, in part, by a presentation Marks saw on using drug cocktails to treat HIV.
"What really hit home for me in this lecture was the idea of using drug combinations where each drug had a different mechanism that could enhance the action of the other drug as an appealing way to optimize therapy for resistant organisms," she said. "I was immediately curious to see if using HAMLET together with existing therapies could result in synergistic interactions."
Findings of note:

In lab experiments, HAMLET lowered the dose of antibiotics needed to fight S. pneumoniae and S. aureus by as much as a factor of eight or more.

The effect was so pronounced that drug-resistant superbugs - including a strain of S. aureus insensitive to vancomycin, the "antibiotic of last resort" - regained sensitivity to antibiotics.

Used together, HAMLET and antibiotics eradicated streptococcal and staphylococcal biofilms in petri dishes and deep in the noses of mice. This held true for strains previously resistant to antibiotics.

About HAMLET:

Discovered during Hakansson's time in Catharina Svanborg's laboratory in Lund, Sweden, HAMLET has shown the ability to selectively kill both tumor cells and bacteria.

In certain bacteria (including S. pneumoniae and S. aureus), HAMLET binds to and halts the activity of biological pumps and transporters that help regulate the flow of ions in and out of a cell. HAMLET also binds to and blocks the activity of two enzymes needed for glycolysis, a process bacteria use to obtain energy.

In the bacteria it kills, HAMLET appears to spark a chain of chemical reactions that mirrors what happens in nature when bacterial cells self-destruct for the greater good of a bacterial community (a "biofilm"). This deadly process includes an influx of calcium and the activation of a serine/threonine kinase, and ends with cells rupturing.

What's next:

UB's Office of Science, Technology Transfer and Economic Outreach (STOR) has filed a provisional patent application detailing HAMLET's antibiotic capabilities, and Anders and Hazeline Hakansson have founded a company called Evincor to further develop HAMLET.
"The pharmaceutical industry is currently reluctant to develop antibiotics because they are only used for a short time and they will be used infrequently initially and only when nothing else works," Hazeline Hakansson said. "HAMLET, on the other hand, is more of an adjuvant and can be used widely in combination with common antibiotics; it already has a huge potential market that is only going to increase the next couple of years as antibiotic resistance increases.
"Some people estimate that it's only a question of time before we run out of antibiotics to combat bacteria," she continues. "HAMLET is promising because we haven't been able to make bacteria resistant to it and it kills bacteria via a mechanism that is clearly different from that of commonly prescribed antibiotics."
The Hakanssons, a husband-and-wife team, say the next step is to test HAMLET on additional strains of S. pneumoniae and S. aureus - including those currently infecting patients - and to expand the in-vivo infection models used for testing to provide a proof of principle.

http://www.sciencedaily.com/releases/2013/04/130430142008.htm

'Catastrophic' Malpractice Payouts Add Little to Health Care's Rising Costs

Review of malpractice claims suggests assertions of large payouts draining health resources are wrong

Efforts to lower health care costs in the United States have focused at times on demands to reform the medical malpractice system, with some researchers asserting that large, headline-grabbing and "frivolous" payouts are among the heaviest drains on health care resources. But a new review of malpractice claims by Johns Hopkins researchers suggests such assertions are wrong.
In their review of malpractice payouts over $1 million, the researchers say those payments added up to roughly $1.4 billion a year, making up far less than 1 percent of national medical expenditures in the United States.
"The notion that frivolous claims are routinely resulting in $100 million payouts is not true," says study leader Marty Makary, M.D., M.P.H., an associate professor of surgery and health policy at the Johns Hopkins University School of Medicine. "The real problem is that far too many tests and procedures are being performed in the name of defensive medicine, as physicians fear they could be sued if they don't order them. That costs upwards of $60 billion a year. It is not the payouts that are bankrupting the system -- it's the fear of them."

Called catastrophic claims, payouts over $1 million are more likely to occur when a patient who is killed or injured is under the age of 1; develops quadriplegia, brain damage or the need for lifelong care as a result of the malpractice; or when the claim results from a problem related to anesthesia, the researchers found in a study published online in the Journal for Healthcare Quality.

Makary and his colleagues reviewed nationwide medical malpractice claims using the National Practitioner Data Bank, an electronic repository of all malpractice settlements or judgments since 1986. They looked at data from 2004 to 2010, choosing a 2004 start date because that is when data regarding the age and gender of patients and severity of injury became available for the first time. The information includes only payments made on behalf of individual providers, not hospitals or other corporations, meaning the number of payouts may be underestimated by 20 percent, Makary says.

Over that period, 77,621 claims were paid, and catastrophic claims made up 7.9 percent (6,130 payouts). The seven-year nationwide total of catastrophic payouts was $9.8 billion, representing 36.2 percent of the $27 billion worth of total claims paid over that time period.

The most common allegations associated with a catastrophic payout were diagnosis-related (34.2 percent), obstetrics-related (21.8 percent) and surgery-related (17.8 percent) events. Errors in diagnosis showed twice the odds of a catastrophic payout compared with equipment- or product-related errors and were associated with a roughly $83,000 larger payment.

The age of the physician was unrelated to the likelihood of a claim, suggesting inexperience is not necessarily a factor. But 37 percent of catastrophic payouts involved a physician with a previous claim in the database. The largest payout in the study was $31 million.

Makary says the data suggest that the focus of legal reform efforts should be on doctor protections aimed at reducing defensive medicine rather than the creation of malpractice caps.

He says his findings argue for more research to determine what interventions might prevent the type of errors that result in catastrophic payouts, with the overall goal of improving patient safety and reducing costs at the same time.

But real cost reductions, he says, will come from reducing the overuse of diagnostic tests and procedures.

Other Johns Hopkins researchers who contributed to this study include Paul J. Bixenstine, B.A.; Andrew D. Shore, Ph.D.; and Julie A. Freischlag, M.D.

Paul J. Bixenstine, Andrew D. Shore, Winta T. Mehtsun, Andrew M. Ibrahim, Julie A. Freischlag, Martin A. Makary. Catastrophic Medical Malpractice Payouts in the United States. Journal for Healthcare Quality, 2013; DOI: 10.1111/jhq.12011

http://www.sciencedaily.com/releases/2013/04/130430194039.htm

The Right Amount of Vitamin D for Babies: 400 IU Daily Dose for Suggested for Infants Under One Year of Age

Parents are recommended to give their babies a daily vitamin D supplement, but how much should be given?

Vitamin D is crucial to the growth of healthy bones. It is especially important that babies get enough of it during the first twelve months of their lives when their bones are growing rapidly. This is why health care providers frequently recommend that parents give their babies a daily vitamin D supplement. But how much vitamin D should babies be given?

A new study led by Prof. Hope Weiler, from the School of Dietetics and Human Nutrition at McGill University and by Dr. Celia Rodd of McGill's Department of Pediatrics, has just confirmed that 400 IU of vitamin D daily is sufficient for infant health.

"There's sometimes a feeling that more is better," says Prof. Weiler. "But until now, no one had compared the popularly recommended daily doses of vitamin D to see what will result in optimal health for infants, so we were very glad to be able to do this."

Current recommendations about how much vitamin D a baby needs daily in order to build healthy bones and prevent rickets vary widely. In France and Finland, the recommended daily dose is of 1,000 IU for infants. At the lower end of the scale, Health Canada and the World Health Organization both recommend a daily dose of 400 IU. The Canadian Pediatric Society distinguishes between winter and summer months and recommends that infants be given 800 IU per day during the winter when babies get less exposure to sunshine. (Vitamin D is sometimes called the "sunshine vitamin" because with enough sunshine, most people can make it themselves. Babies are not expected to do so and our northern climate limits synthesis in the colder months from about October to April.).

The team followed a group of 132 infants in Montreal who were randomly assigned to receive different daily doses of vitamin D (400 IU per day, 800 IU, 1200 IU and 1600 IU) over a period of 12 months. After their initial intake in the study, the researchers then measured the babies' weight, length, and head circumference, as

well as the levels of vitamin D in their blood at three months, six months, nine months and a year of age. They also looked at how much mineral was added to the babies' bones as they grew.
It was clear, as early as the three-month mark, that there was no advantage to the higher doses of vitamin D and that 400 IU per day was sufficient. "The parents that we saw in the study were highly motivated and made sure that their babies were taking the vitamin D on a daily basis," says Dr. Rodd. The researchers concluded that higher doses provided no additional benefits in terms of helping babies grow a healthy skeleton.
The researchers acknowledge that their infant group had fairly good amounts of vitamin D at the beginning of the study. Therefore, whether higher amounts are needed in infants with lower vitamin D at birth still needs to be clarified.
Sina Gallo et al. Effect of Different Dosages of Oral Vitamin D Supplementation on Vitamin D Status in Healthy, Breastfed InfantsA Randomized Trial. JAMA, 2013 DOI: 10.1001/jama.2013.3404

http://www.sciencedaily.com/releases/2013/04/130430194259.htm

Cheating Favors Extinction, Yeast Study Finds: Feedback Between Population and Evolutionary Dynamics

A new study has found that a yeast colony dominated by non-producers ('cheaters') is more likely to face extinction than one consisting entirely of producers ('co-operators').

Cooperative behaviour is widely observed in nature, but there remains the possibility that so-called 'cheaters' can exploit the system, taking without giving, with uncertain consequences for the social unit as a whole. A new study has found that a yeast colony dominated by non-producers ('cheaters') is more likely to face extinction than one consisting entirely of producers ('co-operators').
The findings, published April 30 in the open access journal PLOS Biology by Alvaro Sanchez and Jeff Gore from the Massachusetts Institute of Technology, are the results of the first laboratory demonstration of a full evolutionary-ecological feedback loop in a social microbial population.
The researchers found that while a cooperative yeast colony that survives by breaking down sucrose into a communal supply of simple sugars can support a surprisingly high ratio of freeloaders -- upwards of 90 per cent -- a sudden shock to its environment is highly likely to result in catastrophe.
"One of the main things we were interested in was the idea that natural selection can have an effect on the ecology of a population, so that as a population is evolving, natural selection affects the ecological properties," said Dr Sanchez.
The researchers studied a cooperative species, Saccharomyces cerevisiae or 'baker's yeast', focusing on two strains: one which had the SUC2 gene that produces the enzyme invertase (the co-operators), and one lacking SUC2 (the cheaters) making it unable to produce this enzyme. Invertase breaks down sucrose in the environment to liberate glucose and fructose that can be used by all yeast cells in the colony.
"We were very surprised by the fact that the total population size for the mixed group (consisting of both co-operators and cheaters) was about the same at equilibrium as the total population size in the absence of cheaters (i.e. purely co-operators). We didn't expect that," Dr Sanchez explained.
"If it weren't for the fact that the co-operators and cheaters were labelled with different colours, it would have been very hard to tell whether the population contained any cheaters or not."
This was the case when the environment was benign. But when those stable populations were suddenly exposed to a harsh environment, all of the pure co-operator populations survived, while just one of six mixed populations adapted to the fast deterioration in conditions, the researchers found.
Benjamin Allen, Assistant Professor of Mathematics at Emmanuel College and Martin A. Nowak, director of the Program for Evolutionary Dynamics at Harvard University, co-authored an accompanying Primer in PLOS Biology, "Cooperation and the Fate of Microbial Societies."
"The experiments of Sanchez and Gore beautifully illustrate the central dilemma in the evolution of cooperation. The yeast society depends on cooperation, but if cooperation is plentiful, 'cheaters' can exploit the generosity of others. This leads to cycles of cooperation and exploitation," said Dr Allen.
The researchers found that an eco-evolutionary feedback loop links changes in population size, and their effects, with changes in the frequency of specific genetic types in the population.
During the competition for survival between co-operators and cheaters, they showed that if the population starts off with sufficient co-operators then the social properties of the yeast spiral towards a final equilibrium position that comprises a stable mixture of co-operators and cheaters.
However, if the initial population density, or the initial proportion of co-operators, is too low, then not enough simple sugars are produced, and the colony dies out.
A, Gore J. Feedback between Population and Evolutionary Dynamics Determines the Fate of Social Microbial Populations. PLoS Biol, 2013 DOI: 10.1371/journal.pbio.1001547

http://www.eurekalert.org/pub_releases/2013-05/uonc-bkb050113.php

Baby knows best: Fetuses emit hormone crucial to preventing preeclampsia

In a study using mice, researchers from the University of North Carolina at Chapel Hill found that a hormone, adrenomedullin, plays a crucial role in preventing the pregnancy complication preeclampsia.

CHAPEL HILL, N.C. –Surprisingly, this hormone protects women from preeclampsia when emitted by the fetus, not the mother, during the most critical times in pregnancy.

"We've identified the fact that the baby is important in protecting the mom from preeclampsia," said the study's senior author, Kathleen M. Caron, Ph.D., Assistant Dean for Research at the UNC School of Medicine and an associate professor in the Department of Cell Biology and Physiology. "If the baby's cells are not secreting this hormone, the mother's blood vessels don't undergo the dilation that they should."

Preeclampsia affects roughly one in fifteen pregnancies. An important characteristic of the condition is that blood vessels in the placenta fail to enlarge, or dilate, to accommodate increased blood flow to the fetus. Untreated, it can threaten the life of both mother and baby.

"We really don't know that a pregnant woman is going to get preeclampsia until she has it," said Caron. Because the condition has numerous risk factors and causes, it's difficult for doctors to know which patients are at highest risk. "Identifying molecules that could predict preeclampsia would be really important."

The researchers studied mice that were genetically programmed to produce either reduced or increased levels of adrenomedullin. The study revealed that in a normal pregnancy, the fetus secretes adrenomedullin into the placenta during the second trimester, signaling special cells called "natural killer cells" to help dilate the mother's blood vessels and allow more blood to flow to the growing fetus.

The study is one of the first to identify an important chemical message sent from fetus to mother in the womb. Scientists understand more about the mom's side of the 'chemical conversation' that goes on between mother and baby, but much of the hormonal signaling in the placenta remains a mystery.

By identifying the key role of adrenomedullin, the research could pave the way to new methods for detecting and preventing preeclampsia. For example, adrenomedullin levels could potentially be used as a biomarker, or early indicator, to identify which patients might be predisposed to the condition. "Having a biomarker would be wonderful - it could allow the physician to manage a woman differently in the early part of her pregnancy," said Caron.

As a next step, the researchers plan to build upon their mouse studies to examine patterns of adrenomedullin levels and preeclampsia in pregnant women.

This paper was published online ahead of print on May 1, 2013 in the Journal of Clinical Investigation (JCI). The paper will appear in the June 2013 print edition.

The study's co-authors include Manyu Li, Nicole M.J. Schwerbrock, Patricia M. Lenhart, Kimberly L. Fritz-Six, Mahita Kadmiel, Kathleen S. Christine, Scott T. Espenschied, Helen H. Willcockson and Christopher P. Mack of UNC and Daniel M. Kraus of Duke University Medical Center.

http://www.eurekalert.org/pub_releases/2013-05/uom-fog050113.php

Fossil of great ape sheds light on evolution

Researchers who unearthed the fossil specimen of an ape skeleton in Spain in 2002 assigned it a new genus and species, Pierolapithecus catalaunicus.

COLUMBIA, Mo. – They estimated that the ape lived about 11.9 million years ago, arguing that it could be the last common ancestor of modern great apes: chimpanzees, orangutans, bonobos, gorillas and humans. Now, a University of Missouri integrative anatomy expert says the shape of the specimen's pelvis indicates that it lived near the beginning of the great ape evolution, after the lesser apes had started to develop separately but before the great ape species began to diversify.

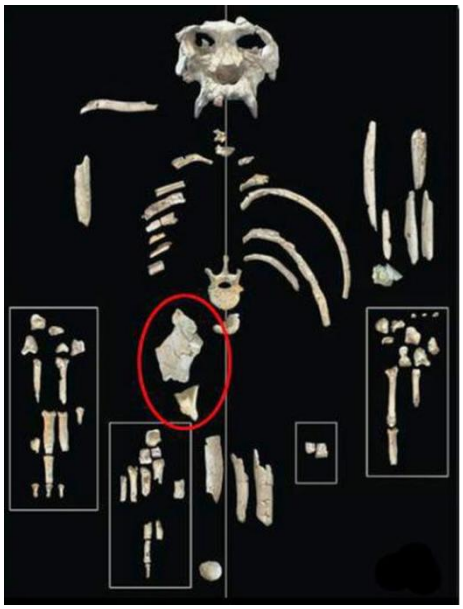
Ashley Hammond, a Life Sciences Fellow in the MU Department of Pathology and Anatomical Sciences, is the first to examine the pelvis fragments of the early hominid. She used a tabletop laser scanner attached to a turntable to capture detailed surface images of the fossil, which provided her with a 3-D model to compare the Pierolapithecus pelvis anatomy to living species.

Hammond says the ilium, the largest bone in the pelvis, of the Pierolapithecus catalaunicus is wider than that of Proconsul nyanzae, a more primitive ape that lived approximately 18 million years ago. The wider pelvis may be related to the ape's greater lateral balance and stability while moving using its forelimbs. However, the fingers of the Pierolapithecus catalaunicus are unlike those of modern great apes, indicating that great apes may have evolved differently than scientists originally hypothesized.

"Pierolapithecus catalaunicus seemed to use a lot of upright behaviors such as vertical climbing, but not the fully suspensory behaviors we see in great apes alive today," Hammond said. "Today, chimpanzees, orangutans, bonobos and gorillas use forelimb-dominated behaviors to swing below branches, but Pierolapithecus

catalaunicus didn't have the long, curved finger bones needed for suspension, so those behaviors evolved more recently."

Hammond suggests researchers continue searching for fossils to further explain the evolution of the great apes in Africa. "Contrary to popular belief, we're not looking for a missing link," Hammond said. "We have different pieces of the evolutionary puzzle and big gaps between points in time and fossil species. We need to continue fieldwork to identify more fossils and determine how the species are related and how they lived. Ultimately, everything is connected."



The study, "Middle Miocene Pierolapithecus provides a first glimpse into early hominid pelvic morphology," will be published in an upcoming issue of the Journal of Human Evolution. The Department of Pathology and Anatomical Sciences is in the MU School of Medicine. Co-authors included David Alba from the Autonomous University of Barcelona in Spain and the University of Turin in Italy, Sergio Almécija from Stony Brook University in New York, and Salvador Moyà-Solà from the Miquel Crusafont Institute of Catalan Palaeontology at Autonomous University of Barcelona.

Following an in-depth examination of an ancient ape, a University of Missouri integrative anatomy expert says the shape of the specimen's pelvis indicates that it lived near the beginning of the great ape evolution, after the lesser apes had started to develop separately but before the great ape species began to diversify. **University of Missouri**

http://www.sciencedaily.com/releases/2013/05/130501101126.htm

Sharp Rise in Emergency Department Visits Involving the Sleep Medication Zolpidem

A new report shows that the number of emergency department visits involving adverse reactions to the sleep medication zolpidem rose nearly 220 percent from 6,111 visits in 2005 to 19,487 visits in 2010.

The Substance Abuse and Mental Health Services Administration (SAMHSA) report also finds that in 2010 patients aged 45 or older represented about three-quarters (74 percent) of all emergency department visits involving adverse reactions to zolpidem.

In 2010 there were a total of 4,916,328 drug-related visits to emergency departments throughout the nation. From 2005 to 2010 there was a 274 percent increase in the number of female visits to emergency department involving zolpidem (from 3,527 visits in 2005 to 13,130 in 2010) -- in comparison to a 144 percent increase among males during the same period (2,584 visits in 2005 to 6,306 in 2010). In 2010 females accounted for more than two-thirds (68 percent) of all emergency department visits related to zolpidem.

Zolpidem is an FDA-approved medication used for the short-term treatment of insomnia and is the active ingredient in drugs such as Ambien, Ambien CR, Edluar and Zolpimist. These drugs have been used safely and effectively by millions of Americans, however, in January 2013, FDA responded to increasing numbers of reports of adverse reactions by requiring manufacturers of drugs containing Zolpidem to halve the recommended dose for females. FDA also suggested that manufacturers reduce the recommended dose for men as well.

Adverse reactions associated with the medication include daytime drowsiness, dizziness, hallucinations, agitation, sleep-walking and drowsiness while driving. When zolpidem is combined with other substances, the sedative effects of the drug can be dangerously enhanced. This is especially true when zolpidem is combined with certain anti-anxiety medications and narcotic pain relievers which depress the central nervous system. The report finds that in 2010 half of all emergency department visits related to zolpidem involved its use with other drugs. In 37 percent of all emergency department visits involving zolpidem it was used in combination with drugs that depress the central nervous system.

"Although short-term sleeping medications can help patients, it is exceedingly important that they be carefully used and monitored," said SAMHSA Administrator Pamela S. Hyde. "Physicians and patients need to be aware of the potential adverse reactions associated with any medication, and work closely together to prevent or quickly address any problems that may arise."

SAMHSA has several major efforts underway to promote prevention and risk reduction regarding prescription drug related problems. For example, SAMHSA 's Strategic Prevention Framework -- Partnerships for Success II (SPF-PFS II) grant program provides funding to communities throughout the nation for programs raising awareness about the problems of prescription drug misuse and abuse among persons aged 12 to 25. SAMHSA has also partnered with the National Council on Patient Information and Education on the "Not Worth the Risk -- Even If It's Legal" campaign. The partnership has developed and distributed educational and outreach

messages to encourage parents to communicate with their teens on prescription drug abuse and misuse. These messages have been distributed to television, radio and newspaper outlets across the nation.
The report entitled, Emergency Department Visits for Adverse Reactions Involving the Insomnia Medication Zolpidem is based on findings from the 2005 to 2010 Drug Abuse Warning Network (DAWN) reports. DAWN is a public health surveillance system that monitors drug-related morbidity and mortality through reports from a network of hospital across the nation.

http://www.eurekalert.org/pub_releases/2013-05/afps-wfe050113.php

Wide-eyed fear expressions may help us -- and others -- to locate threats

Wide-eyed expressions that typically signal fear may enlarge our visual field and mutually enhance others' ability to locate threats, according to new research published in Psychological Science, a journal of the Association for Psychological Science.

The research, conducted by psychology graduate student Daniel Lee of the University of Toronto with advisor Adam Anderson, suggests that wide-eyed expressions of fear are functional in ways that directly benefit both the person who makes the expression and the person who observes it.
The findings show that widened eyes provide a wider visual field, which can help us to locate potential threats in our environment. But these widened eyes also help to send a clearer gaze signal telling observers to "look there," which may enhance their ability to locate the same threat, as well.
"Emotional expressions look the way they do for a reason," says Lee. "They are socially useful now for communicating emotional states, but this new research suggests that they were also useful as raw physical signals."
Lee and colleagues found that participants who made wide-eyed fear expressions were able to discriminate visual patterns farther out in their peripheral vision than were participants who made neutral expressions or expressions of disgust.
Next, they investigated the benefits that wide-eyed expressions might confer to onlookers.
The researchers found that participants were better able to tell which direction a pair of eyes was looking as the eyes became wider. And wider eyes helped participants respond to targets that were located in the direction of the gaze. Importantly, these benefits did not depend on recognizing the eyes as fearful.
So why are wide-eyed expressions so helpful for onlookers?
As eyes become wider, we see more of the whites of the eyes, known as sclera. Lee and colleagues hypothesized that this could increase the contrast with the irises that signal the gaze, making it easier to tell where someone is looking. Indeed, their data revealed that iris display and higher iris-to-sclera contrast were correlated with faster response times.
Lee believes that this research demonstrates just how social we are wired to be:
"Our ability to process other people's eye gaze is already finely-tuned; the fact that this processing is further enhanced by expressive eye widening underscores the importance of our eyes as social signals."
Study co-authors include Joshua Susskind of the University of California, San Diego.

http://nyti.ms/10f4F3t

Cancers Share Gene Patterns, Studies Affirm

Scientists have discovered that the most dangerous cancer of the uterine lining closely resembles the worst ovarian and breast cancers, providing the most telling evidence yet that cancer will increasingly be seen as a disease defined primarily by its genetic fingerprint rather than just by the organ where it originated.

By GINA KOLATA

The study of endometrial cancer - the cancer of the uterine lining - and another of acute myeloid leukemia, published simultaneously on Wednesday by Nature and The New England Journal of Medicine, are part of a sprawling, ambitious project by the National Institutes of Health to scrutinize DNA aberrations in common cancers.
Over the past year, as part of this project, researchers have reported striking genetic changes in breast, colon and lung cancers that link them to other cancers. One kind of breast cancer was closely related to ovarian cancer. Colon cancers often had a genetic change found in breast cancer. And about half of squamous cell lung cancers might be attacked by drugs being developed for other cancers.
The endometrial cancer and leukemia efforts alone involved more than 100 researchers who studied close to 400 endometrial tumors and 200 leukemias. Endometrial cancer is the most common gynecological cancer in American women and strikes nearly 50,000 of them a year, killing about 8,000.
Acute myeloid leukemia, the most prevalent acute adult leukemia, is diagnosed in about 14,000 Americans a year and kills about 10,000.

"This is exploring the landscape of cancer genomics," said Dr. David P. Steensma, a leukemia researcher at the Dana-Farber Cancer Institute who was not involved with the studies. "Many developments in medicine are about treatments or tests that are only useful for a certain period of time until something better comes by. But this is something that will be useful 200 years from now. This is a landmark that will stand the test of time."
Dr. Douglas Levine of Memorial Sloan Kettering Cancer Center, the principal investigator on the endometrial cancer study, said the group scoured the country for samples of this cancer.
The cancer has long been evaluated by pathologists who examine thin slices of endometrial tumors under a microscope and put them in one of two broad categories. But the method is not ideal. In general, one category predicts a good prognosis and tumors that could be treated with surgery and radiation, while the other holds a poorer prognosis and requires chemotherapy after surgery. But pathologists often disagree about how to classify the tumors and can find it difficult to distinguish between the two types, Dr. Levine said.
The new genetic analysis of hundreds of tumors found patterns of genetic aberrations that more precisely classify the tumors, dividing them into four distinct groups. About 10 percent of tumors that had seemed easily treated with the old type of exam now appear to be more deadly according to the genetic analysis and would require chemotherapy.
Another finding was that many endometrial cancers had a mutation in a gene that had been seen before only in colon cancers. The mutation disables a system for repairing DNA damage, resulting in 100 times more mutations than typically occur in cancer cells. "That was a complete surprise," Dr. Levine said.
It turned out to be good news. Endometrial cancers with the mutation had better outcomes, perhaps because the accumulating DNA damage is devastating to cancer cells.
Another surprise was that the worst endometrial tumors were so similar to the most lethal ovarian and breast cancers, raising the tantalizing possibility that the three deadly cancers might respond to the same drugs.
Jeff Boyd, executive director of the Cancer Genome Institute at Fox Chase Cancer Center, who was not involved with the new research, said the similarity among breast, ovarian and endometrial tumors was the best example yet of the idea that cancers are more usefully classified by their gene mutations than by where they originate.
Though many scientists believe this view is correct, Dr. Boyd said, "It is very rewarding - I can't overstate it" to see it validated with real data.
While the genetics of endometrial cancer had gone largely unstudied until now, acute myeloid leukemia has been investigated for decades, in part because leukemia cells are so accessible. They are in the blood and bone marrow.
Using microscopes and special staining methods, researchers had already discovered, for example, that chromosomes in these leukemia cells are often broken or hooked together in strange ways. They also knew that some chromosomal alterations were associated with a good prognosis, and others with a bad one. Patients with a good prognosis can usually be treated with chemotherapy alone while those with a worse prognosis need the expensive, difficult and risky treatment of last resort: a bone marrow transplant. It comes with a 10 percent death rate.
The problem was that the traditional methods for categorizing the leukemia were imprecise, said Dr. Timothy Ley of Washington University in St. Louis, who led the study with Richard Wilson, also of Washington University.
Nearly half the acute myeloid leukemias had normal chromosomes. There was no good way to decide which treatment these patients needed. Some did well with chemotherapy; some did poorly.
"It was a huge conundrum," Dr. Ley said. "For patients who cannot be cured with chemotherapy, we have a potentially curative therapy. But picking the right patients for a transplant was very difficult."
The new study of 200 acute myeloid leukemias identified at least 260 genes that were mutated in at least 2 of the 200 leukemia samples, finding virtually all of the common genetic malfunctions that occur in it.
Now researchers have a new foundation for assessing which cancers will be lethal unless the patient gets a risky bone marrow transplant and which can be treated with chemotherapy alone.
"We have the basic playbook," Dr. Ley said. "We finally know what the major pathways are and what all the major mutations look like." And knowing which genes are mutated also allows researchers to investigate drugs that target those genes.
The next step will be for investigators to determine which mutations lead to good or bad outcomes.
"Within two or three years, risk assessment may be dramatically better," Dr. Ley said. "It certainly sets the stage for the next era of therapy."

http://www.bbc.co.uk/news/world-middle-east-22378541

Saudi Arabia Sars-like virus 'kills five'

Five people in Saudi Arabia have died from a Sars-like virus and two more are seriously ill, officials say.

The seven cases were all from al-Ahsa governorate in the east of the country, the Saudi news agency SPA said citing health officials. The novel coronavirus (NCoV) causes pneumonia and sometimes kidney failure. It is from the same family of viruses as the one that caused an outbreak of Severe Acute Respiratory Syndrome (Sars) that emerged in Asia in 2003.

Novel coronavirus

Coronaviruses are a large family of viruses that include the common cold and Sars

NCoV causes respiratory infections in humans and animals

May be a mutation of existing virus or an infection in animals that has made the jump to humans

NCoV does appear to be closely related to a virus in bats

WHO notification

In the statement released by SPA, the Saudi health ministry said it was taking "all precautionary measures for persons who have been in contact with the infected people... and has taken samples from them to examine if they are infected". However, the ministry gave no details on how many people had been tested for the disease.

In a statement, the World Health Organization said the cases were not from the same family and preliminary inquiries showed "no indication of recent travel or animal contact" in any of the confirmed cases.

In March, WHO said it had been informed of 17 confirmed cases of NCoV worldwide, including 11 deaths. Cases have been detected in Saudi Arabia, Jordan, Germany and the UK.

Correspondents say the exact source of the new virus and how it spreads are still unknown. One theory is that it comes from animals. The threat to the general population is thought to be small, although the virus has shown signs of spreading in people.

According to WHO, the last known death from NCoV was a 73-year-old man from the United Arab Emirates in March. In February, a patient died in a hospital in Birmingham, England, after three members of the same family became infected. It is thought a family member had picked up the virus while travelling to the Middle East and Pakistan.

http://www.eurekalert.org/pub_releases/2013-05/uom-wsp050113.php

World-first study predicts epilepsy seizures in humans

A small device implanted in the brain has accurately predicted epilepsy seizures in humans in a world-first study led by Professor Mark Cook, Chair of Medicine at the University of Melbourne and Director* of *Neurology at St Vincent's Hospital.

"Knowing when a seizure might happen could dramatically improve the quality of life and independence of people with epilepsy," said Professor Cook, whose research was today published in the international medical journal, Lancet Neurology.

Professor Cook and his team, with Professors Terry O'Brien and Sam Berkovic, worked with researchers at Seattle-based company, NeuroVista, who developed a device which could be implanted between the skull and brain surface to monitor long-term electrical signals in the brain (EEG data).

They worked together to develop a second device implanted under the chest, which transmitted electrodes recorded in the brain to a hand-held device, providing a series of lights warning patients of the high (red), moderate (white), or low (blue), likelihood of having a seizure in the hours ahead.

The two year study included 15 people with epilepsy aged between 20 and 62 years, who experienced between two and 12 seizures per month and had not had their seizures controlled with existing treatments.

For the first month of the trial the system was set purely to record EEG data, which allowed Professor Cook and his team to construct individual algorithms of seizure prediction for each patient.

The system correctly predicted seizures with a high warning, 65 percent of the time, and worked to a level better than 50 percent in 11 of the 15 patients. Eight of the 11 patients had their seizures accurately predicted between 56 and 100 percent of the time.

Epilepsy is the second most common neurological disease after stroke, affecting over 60 million people worldwide. Up to 40 percent of people are unable to control their seizures with existing treatments.

"One to two percent of the population have chronic epilepsy and up to 10 percent of people will have a seizure at some point in their lives, so it's very common. It's debilitating because it affects young people predominantly and it affects them often across their entire lifespan," Professor Cook said.

"The problem is that people with epilepsy are, for the most part, otherwise extremely well. So their activities are limited entirely by this condition, which might affect only a few minutes of every year of their life, and yet have catastrophic consequences like falls, burns and drowning."

Professor Cook hopes to replicate the findings of the study in larger clinical trials, and is optimistic the technology will lead to improved management strategies for epilepsy in the future.
Collaborators on the study included the Royal Melbourne Hospital and Austin Health, Australia

http://www.eurekalert.org/pub_releases/2013-05/buco-ft050213.php

'Oil for the joints' offers hope for osteoarthritis sufferers

A team of researchers led by a Boston University Biomedical Engineer has developed a new joint lubricant that could bring longer lasting relief to millions of osteoarthritis sufferers.

The new synthetic polymer supplements synovial fluid, the natural lubricant in joints, and works better than comparable treatments currently available.
According to Boston University Professor of Biomedical Engineering Mark W. Grinstaff, the best fluid supplement now available offers temporary symptom relief but provides inadequate lubrication to prevent further degradation of the cartilage surfaces that cushion the joint. To achieve both objectives, Grinstaff, Beth Israel Deaconess Medical Center/Harvard Medical School orthopedic surgeon Brian Snyder and a team of Boston University chemistry and engineering students, fellows and clinicians have advanced the first synthetic synovial fluid. They describe the unique polymer and its performance in Journal of the American Chemical Society.
The most common form of joint disease and a leading cause of disability in the elderly, osteoarthritis (OA) affects about 27 million Americans and 200 million people worldwide. Characterized by pain and swelling, the disease emerges in hand, hip, knee and other commonly used joints where degradation of cartilage and synovial fluid results in bone-on-bone abrasion. Treatments range from anti-inflammatory drugs to total joint replacement. While there's no cure for OA, one treatment - injection of a polymer to supplement synovial fluid in the joint - promises to relieve symptoms and slow the disease's progression by reducing wear on cartilage surfaces.
"From our studies, we know our biopolymer is a superior lubricant in the joint, much better than the leading synovial fluid supplement, and similar to healthy synovial fluid," said Grinstaff. "When we used this new polymer, the friction between the two cartilage surfaces was lower, resulting in less wear and surface-to-surface interaction. It's like oil for the joints."
Originally produced last year for another study, the new polymer mimics some of the properties of natural polysaccharides, large compounds that link repetitive sequences of sugar molecules in a chainlike pattern.
"You put it between your fingers, and it's slippery," Grinstaff observed. "Once we made it, we wondered if we could use it as a lubricant and where it would be useful. That's how we thought of using it as a potential treatment for OA."
Another advantage of the biopolymer is its large molecular weight or size, which prevents it from seeping out of the joint, enabling longer lasting cartilage protection. Unlike the leading synovial fluid supplement, which lasts one or two days, the new polymer remains in the joint for more than two weeks.
The research is supported by the Wallace H. Coulter Foundation and Flex Biomedical, a startup cofounded by Grinstaff and Snyder.

http://www.eurekalert.org/pub_releases/2013-05/foas-qha050313.php

Gray hair and vitiligo reversed at the root

New research in The FASEB Journal suggests that loss of skin or hair color can be corrected by a new compound -- a pseudocatalase -- that reverses oxidative stress

Bethesda, MD - Hair dye manufacturers are on notice: The cure for gray hair is coming. That's right, the need to cover up one of the classic signs of aging with chemical pigments will be a thing of the past thanks to a team of European researchers. In a new research report published online in The FASEB Journal (http://www.fasebj.org) people who are going gray develop massive oxidative stress via accumulation of hydrogen peroxide in the hair follicle, which causes our hair to bleach itself from the inside out, and most importantly, the report shows that this massive accumulation of hydrogen peroxide can be remedied with a proprietary treatment developed by the researchers described as a topical, UVB-activated compound called PC-KUS (a modified pseudocatalase). What's more, the study also shows that the same treatment works for the skin condition, vitiligo.
"To date, it is beyond any doubt that the sudden loss of the inherited skin and localized hair color can affect those individuals in many fundamental ways," said Karin U. Schallreuter, M.D., study author from the Institute for Pigmentary Disorders in association with E.M. Arndt University of Greifswald, Germany and the Centre for Skin Sciences, School of Life Sciences at the University of Bradford, United Kingdom. "The improvement of quality of life after total and even partial successful repigmentation has been documented."
To achieve this breakthrough, Schallreuter and colleagues analyzed an international group of 2,411 patients with vitiligo. Of that group, 57 or 2.4 percent were diagnosed with strictly segmental vitiligo (SSV), and 76 or

3.2 percent were diagnosed with mixed vitiligo, which is SSV plus non-segmental vitiligo (NSV). They found that for the first time, patients who have SSV within a certain nerval distribution involving skin and eyelashes show the same oxidative stress as observed in the much more frequent general NSV, which is associated with decreased antioxidant capacities including catalase, thioredoxin reductase, and the repair mechanisms methionine sulfoxide reductases. These findings are based on basic science and clinical observations, which led to successful patient outcomes regarding repigmentation of skin and eyelashes.
"For generations, numerous remedies have been concocted to hide gray hair," said Gerald Weissmann, M.D., Editor-in-Chief of The FASEB Journal, "but now, for the first time, an actual treatment that gets to the root of the problem has been developed. While this is exciting news, what's even more exciting is that this also works for vitiligo. This condition, while technically cosmetic, can have serious socio-emotional effects of people. Developing an effective treatment for this condition has the potential to radically improve many people's lives."
Special note: This report follows up on a 2009 study, which describes the cause of gray hair. See http://www.eurekalert.org/pub_releases/2009-02/foas-nla022309.php for the press release for that study, and http://www.fasebj.org/content/23/7/2065.full to access the full report.
Details: Karin U. Schallreuter, Mohammed A. E. L. Salem, Sarah Holtz, and A. Panske. Basic evidence for epidermal H2O2/ONOO−-mediated oxidation/nitration in segmental vitiligo is supported by repigmentation of skin and eyelashes after reduction of epidermal H2O2 with topical NB-UVB-activated pseudocatalase PC-KUS. FASEB J doi:10.1096/fj.12-226779 ; http://www.fasebj.org/content/early/2013/04/29/fj.12-226779.abstract

http://www.eurekalert.org/pub_releases/2013-05/ciot-boa050313.php

Birth of a black hole

A new kind of cosmic flash may reveal something never seen before: the birth of a black hole.

Written by Marcus Woo

When a massive star exhausts its fuel, it collapses under its own gravity and produces a black hole, an object so dense that not even light can escape its gravitational grip. According to a new analysis by an astrophysicist at the California Institute of Technology (Caltech), just before the black hole forms, the dying star may generate a distinct burst of light that will allow astronomers to witness the birth of a new black hole for the first time.
Tony Piro, a postdoctoral scholar at Caltech, describes this signature light burst in a paper published in the May 1 issue of the Astrophysical Journal Letters. While some dying stars that result in black holes explode as gamma-ray bursts, which are among the most energetic phenomena in the universe, those cases are rare, requiring exotic circumstances, Piro explains. "We don't think most run-of-the-mill black holes are created that way." In most cases, according to one hypothesis, a dying star produces a black hole without a bang or a flash: the star would seemingly vanish from the sky - an event dubbed an unnova. "You don't see a burst," he says. "You see a disappearance."
But, Piro hypothesizes, that may not be the case. "Maybe they're not as boring as we thought," he says.
According to well-established theory, when a massive star dies, its core collapses under its own weight. As it collapses, the protons and electrons that make up the core merge and produce neutrons. For a few seconds - before it ultimately collapses into a black hole - the core becomes an extremely dense object called a neutron star, which is as dense as the sun would be if squeezed into a sphere with a radius of about 10 kilometers (roughly 6 miles). This collapsing process also creates neutrinos, which are particles that zip through almost all matter at nearly the speed of light. As the neutrinos stream out from the core, they carry away a lot of energy - representing about a tenth of the sun's mass (since energy and mass are equivalent, per E = mc2).
According to a little-known paper written in 1980 by Dmitry Nadezhin of the Alikhanov Institute for Theoretical and Experimental Physics in Russia, this rapid loss of mass means that the gravitational strength of the dying star's core would abruptly drop. When that happens, the outer gaseous layers - mainly hydrogen - still surrounding the core would rush outward, generating a shock wave that would hurtle through the outer layers at about 1,000 kilometers per second (more than 2 million miles per hour).
Using computer simulations, two astronomers at UC Santa Cruz, Elizabeth Lovegrove and Stan Woosley, recently found that when the shock wave strikes the outer surface of the gaseous layers, it would heat the gas at the surface, producing a glow that would shine for about a year - a potentially promising signal of a black-hole birth. Although about a million times brighter than the sun, this glow would be relatively dim compared to other stars. "It would be hard to see, even in galaxies that are relatively close to us," says Piro.
But now Piro says he has found a more promising signal. In his new study, he examines in more detail what might happen at the moment when the shock wave hits the star's surface, and he calculates that the impact itself would make a flash 10 to 100 times brighter than the glow predicted by Lovegrove and Woosley. "That flash is going to be very bright, and it gives us the best chance for actually observing that this event occurred," Piro explains. "This is what you really want to look for."

Such a flash would be dim compared to exploding stars called supernovae, for example, but it would be luminous enough to be detectable in nearby galaxies, he says. The flash, which would shine for 3 to 10 days before fading, would be very bright in optical wavelengths - and at its very brightest in ultraviolet wavelengths.
Piro estimates that astronomers should be able to see one of these events per year on average. Surveys that watch the skies for flashes of light like supernovae - surveys such as the Palomar Transient Factory (PTF), led by Caltech - are well suited to discover these unique events, he says. The intermediate Palomar Transient Factory (iPTF), which improves on the PTF and just began surveying in February, may be able to find a couple of these events per year.
Neither survey has observed any black-hole flashes as of yet, says Piro, but that does not rule out their existence. "Eventually we're going to start getting worried if we don't find these things." But for now, he says, his expectations are perfectly sound.
With Piro's analysis in hand, astronomers should be able to design and fine-tune additional surveys to maximize their chances of witnessing a black-hole birth in the near future. In 2015, the next generation of PTF, called the Zwicky Transient Facility (ZTF), is slated to begin; it will be even more sensitive, improving by several times the chances of finding those flashes. "Caltech is therefore really well-positioned to look for transient events like this," Piro says.
Within the next decade, the Large Synoptic Survey Telescope (LSST) will begin a massive survey of the entire night sky. "If LSST isn't regularly seeing these kinds of events, then that's going to tell us that maybe there's something wrong with this picture, or that black-hole formation is much rarer than we thought," he says.
The Astrophysical Journal Letters paper is titled "Taking the 'un' out of unnovae." This research was supported by the National Science Foundation, NASA, and the Sherman Fairchild Foundation.

http://www.eurekalert.org/pub_releases/2013-05/nion-mab043013.php

Media advisory: Brain cell injections may quiet epileptic seizures

NIH-supported study suggests cell therapy may be a viable approach

More than two million people in the United States suffer from epilepsies, a group of neurological disorders caused by abnormal nerve cell firing in the brain which often produce debilitating seizures. Although anti-epileptic drugs and other therapies reduce seizures in about two-thirds of patients, the remaining one-third do not respond to any form of therapy and those who take drugs can experience harmful side effects. NIH funded researchers at the University of California at San Francisco used a mouse model of epilepsy to show that transplanting new born inhibitory nerve cells can quiet seizures. Inhibitory cells are one of two major nerve cell groups, the other being excitatory. Their results, published in Nature Neuroscience, show that injecting new inhibitory cells into the hippocampus in the brains of adult epileptic mice greatly reduced the occurrence of seizures and reversed some learning and memory problems associated with the disorder. Analysis of the mice brains suggested the new cells became fully incorporated into the brain regions where they were injected. The results support the idea that cell therapies may provide precise and novel ways to treat epilepsy and other neurological disorders.
This study was supported by grants from NINDS (NS071785, NS077747) and a grant from the California Institute of Regenerative Medicine (#TR2-01749).
Hunt et al. "GABA progenitor grafted into the adult epileptic brain control seizures and abnormal behavior" Nature Neuroscience, May 5, 2013. DOI: 10.1038/nn.3392

http://phys.org/news/2013-05-mars-exploration-experts.html

Dream of Mars exploration achievable, experts say

NASA and private sector experts now agree that a man or woman could be sent on a mission to Mars over the next 20 years, despite huge challenges.

The biggest names in space exploration, among them top officials from the US space agency and Buzz Aldrin, the second man to walk on the moon, will discuss the latest projects at a three-day conference starting Monday in the US capital. Renewed interest in the red planet has triggered the launch of several initiatives in recent months, including one proposing a simple one-way trip to cut costs.
The American public also favors sending astronauts to Mars, according to a survey by non-profit group Explore Mars and aerospace giant Boeing. The poll in March of more than a thousand people published in March found that 71 percent of Americans expect that humans will land on Mars by 2033. Seventy-five percent say NASA's budget should be doubled to one percent of the federal budget to fund a mission to Mars and other initiatives.
NASA receives only 0.5 percent of the US federal budget, compared to four percent during the Apollo project to conquer the moon in the 1960s. The US space agency's chief Charles Bolden has stressed that "a human mission to Mars is a priority."

But the US financial crisis is a major obstacle to such a project. "If we started today, it's possible to land on Mars in 20 years," said G. Scott Hubbard of Stanford University. "It doesn't require miracles, it requires money and a plan to address the technological engineering challenges," added Hubbard, who served as NASA's first Mars program director and successfully restructured the entire Mars program in the wake of mission failures.
Placing a mass of 30-40 tonnes—the amount estimated to be necessary to make a habitat on the red planet—would be one of the greatest challenges, along with the well-known problem of carrying or producing enough fuel to get back, Hubbard stressed.
The Curiosity rover took a nail-biting seven minutes in August to make its descent on Mars. But it only weighed one tonne. The $2.5 billion Curiosity mission, which is set to last at least two years, aims to study the Martian environment and to hunt for evidence of water in preparation for a possible future manned mission.
Robotic missions will therefore be necessary to prove the system works before scientists can even contemplate sending humans aboard.
NASA is developing a Space Launch System and the Orion capsule for distant space exploration.
Hubbard said a nuclear engine should be developed for any vehicle headed to Mars because it would provide a continuous thrust and thus reduce travel time by about three months, as well as reduce the risk of radiation.
The distance between Earth and Mars varies between 35 million and 250 million miles (56 million and 400 million kilometers), depending on the planets' position.
In addition to the technological challenges, the negative impact of long space journeys on the human body are not yet well known, especially with respect to cosmic radiation.
"Space radiation exposure is certainly a human risk we need to address and understand," said Stephen Davison, manager of NASA's Space Biology and Physical Sciences Program at Johnson Space Center where astronauts are trained. Davison said it was important to understand "both the cancer risk to our crew members in more detail and also the effects on the central nervous system." He added that more than half of crew members at the International Space Center have experience some degree of change in their vision, and also have experienced intra-cranial pressure.
Other physiological changes, such as reduced bone density and muscle loss, can be mitigated by exercise.
The third major challenge is a psychological one, for isolated astronauts who spend long periods of time confined in cramped spaces. Davison said scientists need a "minimum" of 10 years to complete research about the trip's impact on the human body before going to Mars.

http://www.wired.com/wiredscience/2013/05/coronavirus-transparency/

New Diseases and National Transparency: Who Is Measuring Up?

The World Health Organization has been monitoring the gradual accumulation of coronavirus cases, but there has been almost nothing published since last fall

By Maryn McKenna

I'm still catching up on all the news that happened during the weeks I was away, and I had a food-policy post just about set to go today. And then this happened.
I opened my morning mail to find a note from a private list I subscribe to, published by a company that monitors hazards for businesses with expatriate employees. The note flagged new news from Saudi Arabia:
Saudi Arabia: Seven more case of novel coronavirus reported
Seven people in Al-Ahsa governate in the Eastern province have been confirmed infected with the novel coronavirus. Five have died and the other two are critically ill in intensive care. It is unclear whether there are any links between these cases or whether they are "sporadic" infections. Overall the risk to travellers remains low.
This was odd. You'll remember the new coronavirus, distantly related to SARS, which surfaced last year in a slow and not well-disclosed manner (for the back story, see these posts from last September, October, November and December). Since the initial reveal last year, there has been very little information released about the virus and whatever illness it might be causing. The World Health Organization has been monitoring the gradual accumulation of cases, but there has been almost nothing published since last fall. In fact, though teams from Columbia University and the Centers for Disease Control and Prevention have been to the Kingdom of Saudi Arabia to help investigate the new illness, neither entity has published anything since those trips were made. And at the point at which I opened my inbox this morning, the WHO's last update on the new virus had been published on March 26.*
Meanwhile, of course, the infectious disease world has been riveted by the rapid emergence in China of a different virus, the new avian flu H7N9, and many questions have been aimed at whether the Chinese government, which attempted to conceal the emergence of SARS 10 years ago, has learned the lesson of

transparency. (I talked about that history, and how the world found out about SARS, in this segment from On the Media a few weeks ago.)
Almost since H7N9 emerged in March, though, the WHO and other bodies have been averring that China is actually doing a good job this time around. And with this overnight news from Saudi, it seems that the questions about disease-outbreak transparency may have been directed at the wrong country.
After getting onto Twitter, I discovered that several other journalists (Martin Enserink, Helen Branswell) were also wondering where this had come from. The source for the report I received, and for things they had heard from their sources, seemed to be a Saudi Ministry of Health announcement that was published in Arabic at 10:30pm Riyadh time last night (which given daylight savings'-type time changes is currently 9:30pm in Geneva, WHO headquarters). By mid-afternoon Saudi time today (noon Geneva time, 6 a.m. in the eastern US), the news service Al Arabiya had put up a story which said basically the same thing as the original announcement.
Judging by the Twitter traffic, though, the WHO had not been informed of the Saudi announcement in advance. This is problematic because the cases were obviously not brand new — after all, five of them had already died — and it is supposed to be a government's responsibility, under the mutually agreed-to International Health Regulations, to quickly forward any information about large or novel disease outbreaks of cross-border concern.
By this afternoon, WHO had caught up to the surprise announcement, issuing an update which adds these cases to the global count: 24 lab-confirmed cases in five countries, of whom 16 have died. Just to underline that math: Yesterday, the case count was 17. With this announcement, it went up 40 percent overnight.
By midday their time, Gulf-region media, including the Saudi Gazette and Al Jazeera, along with The National in the neighboring United Arab Emirates, had fleshed out the story. Those reports added a few key details: The victims had all been treated in a single hospital "over the last few days." And by midday East Coast time, Helen Branswell had a story up at CBC News, featuring the WHO sending a not-very-coded message to the Kingdom's government:
Dr. Keiji Fukuda, the WHO's assistant director general for health security and the environment, said the WHO was informed of the cases late Wednesday, but has been given little information about them. It has asked for more, Fukuda said in an interview with The Canadian Press.
"As a matter of course we would prefer to hear and know about things as early as possible. The whole aim of detecting [diseases] is really to try to move and protect as quickly as possible," Fukuda said from Geneva.
"I won't speak for the government of Saudi Arabia, but I can speak for WHO in saying that it's a point that we have made and it's a position that we hold very clearly with everybody."
There has been no more comment on the Saudi Ministry of Health's site so far.
This is obviously a story that is going to continue for a while (in a slow way, one hopes, and not as a burgeoning epidemic). But this is not how the post-SARS International Health Regulations, to which the Saudi government is a signatory, were supposed to work. And it is rather odd to be watching the daily mass scrutiny of the news from China, and not see the same prosecutorial skepticism directed at this outbreak too.
**(Adding for accuracy: The March 26 post is in the Disease Outbreak News section of the WHO website, their usual spot for rapid outbreak updates. I missed though that the Global Alert and Response team published a "summary and literature review" on a separate section of the WHO site on April 25 .)*

http://www.wired.com/wiredscience/2013/05/coronavirus-promed/

Transparency Unlocked: More New Saudi Coronavirus Cases Reported Quickly

The Saudi government behaved very differently with a new report.

- By Maryn McKenna

In my last post 36 hours ago, I raised questions about Saudi Arabia's apparent delay in reporting new cases of the novel coronavirus that has been causing low-level unease since last summer. (For the full history of that, check these posts.) So it's only fair to say that, within 24 hours, the Saudi government behaved very differently with a new report.
The bad news is, the new report is about yet more cases of the novel virus. But the good news is, the report of the new cases was quickly shared internationally, by the government's Deputy Minister for Public Health, via the international disease-alert mailing news ProMED.
Here is the complete post:
Subject: Urgent update nCOV cluster KSA

This is a preliminary update on the status as of a few minutes ago. Three further cases have been discovered from the investigation which is still ongoing:

Case 8: 53 y.o. female with comorbidities. Date of symptoms [27 Apr 2013] she is in stable but critical condition
Case 9: 50 y.o. male with comorbidity. Date of symptoms [30 Apr 2013] with pneumonia and he is well on the inpatient ward.
Case 10: 33 y.o. male with comorbidity. Family contact of a deceased patient. Date of symptoms [28 Apr 2013]. Inpatient in the medical ward and doing well.
As stated earlier our investigation of contacts and active screening of inpatients who fit case definition is ongoing.
Ziad A Memish,MD,FRCP(Can),FRCP(Edin),FRCP(Lond),FACP
Deputy Minister for Public Health
This report is striking for several reasons. First: It appears to be a much quicker alert than the earlier one which raised eyebrows, because the patients are still in hospital (in the earlier one, five of the seven had already died). And it is an active notification, if it's OK to use that surveillance term in this context; that is, it is a push into international public health networks,compared to the earlier posting by the Saudi Press Agency which people might or might not have read. (There is also something quite interesting going on, with a Ministry of Health using the unofficial — that is, non-governmental/non-WHO — channel of ProMED to announce this. It speaks to the ever-growing influence of ProMED in the global conversation about public health.*) The Ministry apparently informed the WHO in a timely manner also, as that agency has a quick update posted here.
Now the obvious concerns: It represents three new cases; it represents at least one possible family cluster, with one of these cases being a relation of a case announced earlier; and it represents a possible local cluster, since according to the extended ProMED post, all 10 — the seven announced Thursday, and these three — are from the same eastern region, Al-Ahsa. In a note appended to the post, ProMED editor Marjorie Pollack puts the reports into a chronology:
From the dates of onset of some of the earlier cases, it seems to suggest there may have been a common exposure(s) and possibly followed by some person-to-person spread — the 1st case had onset on 14 Apr 2017; the next 2 additional cases had onset 3 days later on 17 Apr 2013, followed by 4 additional cases with date of onset 5 days later on 22 Apr. The 3 newer cases (1st reported today 3 May 2013) had dates of onset 27 Apr 2013, 30 Apr 2013 and 28 Apr 2013, only this latter case (with date of onset 28 Apr 2013) is identified as a definite family contact of an earlier onset deceased patient.
She also raises an issue that is implied in the case descriptions but needs to be teased out: whether these cases arose in part because age and underlying ill health made the patients vulnerable:
Of these 10 newly reported cases, all 10 (100 percent) have a history of one or more comorbidities, suggesting a predisposition to more severe illness when confronted with a serious infection. The ages range from 24 years of age to 94 years of age, with the mean age of 57 years (by 10 year age cohorts: 20-29 years old – 1 case; 30-39 years old – 1 case; 40-49 years old – 0 cases; 50-59 years old – 6 cases, 60-69 years old – 0 cases; 70-79 years old – 0 cases; 80-89 years old – 1 case; 90-99 years old – 1 case).
I was traveling again yesterday, but Helen Branswell and my former CIDRAP colleague Robert Roos both got up stories examining this report yesterday evening. They both raise an issue will need further examination: whether some part of this apparent cluster of cases can be traced to hospital procedure. That is important because, if transmission happened not in the outside world but within the hospital — as happened in SARS** — then the perception of how much risk is posed by this new virus could be recalibrated.
There is some interesting chatter in the ProMED post about Al-Ahsa being a date-growing area, which could indicate that bats feeding on the dates are harboring or transmitting the virus. Early analyses of the virus last fall (in these three papers) raised the possibility of bat involvement. On Twitter this morning, though, there is also chatter that we shouldn't leap to that assumption too quickly, and that the granular details of the date-growing economy in the area need to be examined.
There is obviously a great deal more to be learned about this ongoing slow outbreak, which might — or again, depending on the details, might not — be picking up speed. But it's one more reminder that nature is the universe's most expert player of three-card monte. No matter how hard you focus on where you think the problem is, the actual threat may be somewhere else.
(*Disease geeks will know this already, but for those to whom ProMED is a new thing: This volunteer-run list is the reason that the world eventually learned about SARS 10 years ago, during the time when the government of China was still attempting to keep knowledge of that outbreak within its borders — and because of that episode, was the reason the International Health Regulations were rewritten in 2007 to give equal status in disease alerts to "unofficial" communications.)

(**I told the story of the emergence of SARS, within months of it occurring, in a chapter in my book Beating Back the Devil. That chapter used to be on the publisher's website, but I just checked and it apparently was taken down in a redesign. So I may need to put it back up myself, but that will require retyping it. Stay tuned.)

http://www.eurekalert.org/pub_releases/2013-05/jhm-odc050313.php

Oral drops can give kids needle-free relief from asthma, allergies

Sublingual drops may be an option for pediatric allergy sufferers

Allergy shots are commonly used to treat children with severe environmental allergies and asthma, but under-the-tongue drops may offer yet another beneficial — and stick-free — option for pediatric allergy sufferers, according to a Johns Hopkins Children's Center review of existing scientific evidence.

The new research comes on the heels of another recent Hopkins study, which showed that oral drops provide a safe and effective alternative for adult allergy sufferers.

The new review, appearing May 6 in the journal Pediatrics, is an analysis of 34 previously published clinical trials and suggests that both drops and injections work well in alleviating the bothersome symptoms of allergic rhinitis and asthma, the research team says. In addition to being better tolerated by needle-averse children, the oral treatment can be given at home, sparing the family a visit to the doctor's office.

"Our findings suggest the needle-free approach is a reasonable way to provide much-needed relief to millions of children who suffer from asthma or seasonal allergies," says lead author Julia Kim, M.D., M.P.H., a pediatric research fellow at Johns Hopkins Children's Center.

Allergy shots, which contain tiny amounts of proteins found in environmental allergens such as dust mites and pollen, are a standard treatment for severe seasonal allergies in children who do not get relief from medication. However, under-the-tongue drops are not approved for use by the U.S. Food and Drug Administration and are only offered off label by some physicians. The needle-free approach is widely available in Europe, where patients are commonly treated with sublingual pills and drops, the researchers say.

The new findings, Kim notes, are encouraging enough to prompt a second look at oral drops as a treatment option.

The Hopkins researchers first looked at 13 studies that involved 920 children and compared the efficacy of allergy injections to either placebo or standard allergy medication. Overall, the researchers found that injections provide better symptom relief than placebo and standard medication for children with asthma or allergic rhinitis.

The team next analyzed 18 trials involving 1,580 children treated with oral-drop therapy, placebo or standard medication for asthma and rhinitis or either condition alone. In this group, the researchers also found that oral drops provided superior relief of asthma symptoms, compared with patients who got the placebo and/or standard drugs. Oral drops also provided better symptom relief than placebo and standard medication in children with allergic rhinitis or rhino-conjunctivitis, a condition marked by runny nose and itchy, red and swollen eyes.

Only three of the 34 studies in the review directly compared shots and drops and, the investigators say, more head-to-head comparisons may shed better light on the comparative effectiveness of the two treatments. However, the researchers add, the results of the 31 remaining studies they looked at indicate both oral drops and allergy shots can successfully rid children of coughing, sneezing, runny noses, itchy eyes and wheezing.

The three studies that directly compared injections versus oral drops for symptom relief of dust mite-induced asthma and rhinitis showed no strong evidence that children given shots fared better than children who got oral drops, Kim said.

Both treatments, overall, caused relatively mild side effects, such as itching of the mouth, skin rashes or wheezing. A single severe reaction was reported following an injection.

More than 6 million children in the United States suffer from asthma, while allergic rhinitis affects 40 percent of American kids.

The research was funded by the U.S. Agency for Healthcare Research and Quality under grant number HHSA 290-2007-10061. Co-investigators on the study were Sandra Lin, M.D.; Catalina Suarez-Cuervo, M.D.; Yohalakshmi Chelladurai, M.B.B.S., M.P.H.; Murugappan Ramanathan, M.D.; Jodi Segal, M.D., M.P.H.; and Nkiruka Erekosima, M.D., M.P.H., all of Johns Hopkins.