Successful kidney transplantation despite tissue incompatibility

Results comparable with regular transplantation/Published in Transplantation

Donor kidneys can be successfully transplanted even if there is strong tissue incompatibility between donor and recipient. An interdisciplinary working group headed by Dr. Christian Morath, senior consultant at the Department of Nephrology at Heidelberg University Hospital (Medical Director: Professor Dr. Martin Zeier) and Professor Dr. Caner Süsal, head of antibody laboratory in the Department of Transplantation Immunology, showed in a study of 34 sensitized high-risk patients that the success rate in these patients was not different from the success rate of patients with a low immunological risk. After one year, around 95 percent of the transplants were still functioning. The researchers in Heidelberg developed a sophisticated therapy concept especially for this group of high-risk patients. This makes the transplantation center in Heidelberg the leading center in Germany in this area. The results of the study were published in the prestigious journal "Transplantation".

When the kidneys no longer function, patients must either undergo dialysis regularly or receive a donor kidney (transplantation). The organ comes either from a brain dead donor or a person close to the patient (live donor). The blood type and tissue compatibility factors (HLA factors) of donor and recipient should be matched as closely as possible. Since the recipient organism always attempts to reject the foreign organ, even if it has the same HLA factors, patients have to take medication after transplantation for as long as they live to suppress rejection (immunosuppression).

Pre-operative risk assessment for high immunological risk patients

Researchers at the Heidelberg Department of Transplantation Immunology collected data over many years in the world's largest database for kidney transplantation (Collaborative Transplant Study) in order to identify patients who are at a high risk of immunological rejection. These are patients who have formed antibodies against foreign tissue, for example after pregnancies, blood transfusions, or previous transplantations, and therefore have only a slight chance of receiving a donor organ for which the tissue compatibility test (crossmatch) directly before the operation is negative. "The risk of rejecting the transplanted organ soon after the operation is especially high in this group of patients. High-risk patients can receive transplants successfully only if additional measures are taken," explained Professor Dr. Caner Süsal, head of the antibody laboratory at the Department of Transplantation Immunology.

Same transplant survival rates as for non-immunized patients

In the current study, 34 high immunological risk patients were given plasmapheresis or immunoadsorption before and after the transplantation of a donor kidney from a brain dead (28) or live donor (6). These are procedures that remove the antibodies from the blood of the organ recipient. In addition, the patients were given a drug (Rituximab) that destroys the cells that could form new antibodies. With the help of intensive immunosuppression and close monitoring for any signs of rejection, some 95 percent of the transplanted kidneys were still functioning after one year.

Complications from the stronger immunosuppression in comparison with non-sensitized patients were rare and were easily overcome. "With the aid of the criteria we tested, we were able to transplant kidneys to patients who would formerly have needed dialysis their whole life, and at success rates corresponding to those of non-sensitized patients. Our high risk patient program is a good example of how results from research can be successfully implemented clinically after intense evaluation," Dr. Christian Morath and Dr. Jörg Beimler, senior consultant at the Department of Nephrology at Heidelberg University Hospital, were happy to report. "If we proceed according to the new methods, obstacles such as blood group incompatibility and a positive crossmatch are no longer criteria for exclusion for transplantation," added Professor Jan Schmidt, head of the division of transplantation surgery.

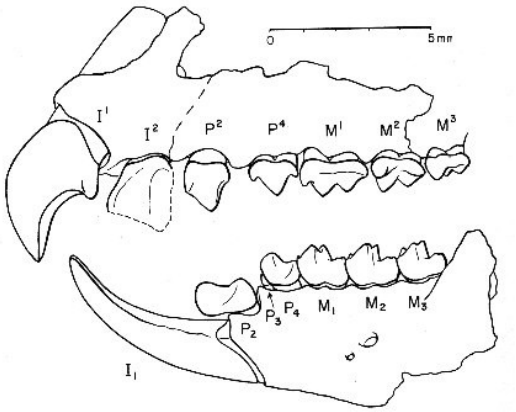
Youngest patient to receive successful transplant thus far

A total of 49 patients have now been treated successfully using the regimen, most recently a child of 13 who was the youngest patient thus far to benefit from the program. "The boy is doing well and the kidney has already begun functioning completely," reported Professor Burkhard Tönshoff, chief consultant at the Center for Child and Adolescent Medicine.

Intensive interdisciplinary cooperation is the key to success

Transplantation in high-risk patients requires the exchange of information between specialists daily or sometimes several times a day and seamless interdisciplinary communication. The excellent results show that the cooperation of various disciplines at the Heidelberg Transplantation Center functions well.

UF research provides new understanding of bizarre extinct mammal



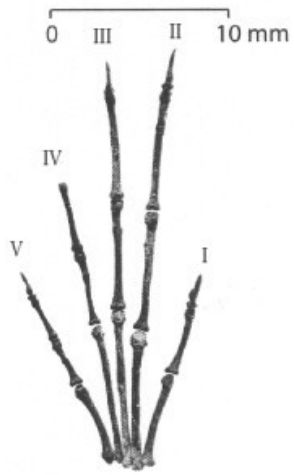
GAINESVILLE, Fla. --- University of Florida researchers presenting new fossil evidence of an exceptionally well-preserved 55-million-year-old North American mammal have found it shares a common ancestor with rodents and primates, including humans.

The study, scheduled to appear in the Oct. 11 online edition of the Zoological Journal of the Linnean Society, describes the cranial anatomy of the extinct mammal, Labidolemur kayi. High resolution CT scans of the specimens allowed researchers to study minute details in the skull, including bone structures smaller than one-tenth of a millimeter. Similarities in bone features with other mammals show L. kayi's living relatives are rodents, rabbits, flying lemurs, tree shrews and primates.

Dentition of Labidolemur kayi, an apatemyid from the Late Paleocene to Early Eocene of North America, showing the greatly enlarged first incisors and the blade-like second lower premolar.

Researchers said the new information will aide future studies to better understand the origin of primates.

"The specimens are among the only skulls of apatemyids known that aren't squashed completely flat," said study co-author Jonathan Bloch, an associate curator of vertebrate paleontology at the Florida Museum of Natural History on the UF campus. "They're preserved in three dimensions, which allows us to look at the morphology of the bones in a way that we never could before."



Scientists have disputed the relationships of Apatemyidae, the family that includes L. kayi, for more than a century because of their unusual physical characteristics. With can opener-shaped upper front teeth and two unusually long fingers, apatemyids have been compared to a variety of animals, from opossums to woodpeckers.

"There are only a few examples in the history of mammals where you get such an incredibly odd ecological adaptation," Bloch said.

Like a woodpecker's method of feeding, L. kayi used percussive foraging, or tapping on trees, to locate insects. It stood less than a foot tall, was capable of jumping between trees and looked like a squirrel with a couple of really long fingers, similar to the aye-aye, a lemur native to Madagascar, Bloch said.

Apatemyids have been preserved for tens of millions of years and are well known from Europe and North America.

Hand of Labidolemur kayi, assembled from a nearly complete skeleton from the Latest Paleocene of Wyoming. Digits I (corresponding to the thumb) to V are marked, with the claw of digit IV not preserved. As in other apatemyids, digits II and III are lengthened to function as tools for extracting insects from crevices.

The skeletons analyzed in the publication were recovered from freshwater limestone in the Bighorn Basin by co-author Peter Houde of New Mexico State University. Located just east of Yellowstone National Park in Wyoming, the site is known as one of the best in the world for studying the evolution of mammals during the 10 million years following the extinction of the dinosaurs, Bloch said.

Mary Silcox, first author of the study and a research associate at the Florida Museum, said scans of the specimens began about 10 years ago, during her postdoctoral work at The Pennsylvania State University.

"It's not like medical CT, it's actually an industrial CT scanner," said Silcox, an assistant professor of anthropology at the University of Toronto Scarborough. "Because this is a small animal, we needed to be able to study it at a very high resolution. The high resolution CT data were a critical part."

Dogs' anxiety reflects a 'pessimistic' mood

Many dogs become distressed when left home alone, and they show it by barking, destroying things, or toileting indoors. Now, a new study reported in the October 12th issue of Current Biology, a Cell Press publication, suggests that this kind of separation anxiety occurs most often in dogs that also show "pessimistic"-like behavior.

"We know that people's emotional states affect their judgments; happy people are more likely to judge an ambiguous situation positively," said Mike Mendl of the University of Bristol. "Now it seems that this may also apply to dogs; dogs that behaved anxiously when left alone also tended to judge ambiguous events negatively. Their anxious behavior may reflect an underlying negative emotional state."

The new findings also raise the possibility that some dogs may be more prone to responding anxiously when left alone than others, and that this is related to their general mood. That's important because "separation-related

behavior is common in dogs, so predicting which dogs may develop this, and treating them appropriately, is very important for ensuring good dog welfare," Mendl said.

The researchers conducted the study with 24 dogs, both male and female, that had recently entered into one of two animal re-homing centers (shelters) in the United Kingdom. Each dog was first tested for separation anxiety-related behaviors. A researcher interacted with each dog in an isolated room for 20 minutes. The following day, they took the dog back to the room and then left it alone for a period of five minutes while its behavior was captured on video. In those five minutes, the researchers observed barking, jumping on furniture, scratching at the door, and repetitive behaviors to varying extents depending on the dog.

In order to study decision making in those same dogs, the researchers trained them to expect that when a bowl was placed at one location in a room (the "positive" position), it would contain food, but when placed at another location (the "negative" position), it would be empty. They then placed the bowl in ambiguous locations in between the positive and negative positions. Dogs that ran quickly to those ambiguous locations, as if expecting the positive food reward, were classed as making relatively "optimistic" decisions. Dogs that didn't approach the bowl as if they were expecting a food reward were judged to be "pessimistic."

An analysis of the two sets of behavioral data found that dogs that made more "pessimistic" judgments about whether they would find a food bowl empty or full also expressed more separation-related behaviors.

The results suggest that behavior regarded as "problematic" for owners also has emotional significance for the animals concerned, even when the behavior itself isn't being expressed, the researchers conclude. Mendl says the results also suggest that "optimistic" versus "pessimistic" decision making may be a valuable new indicator of animal emotion.

Dog owners should take note. "Some owners think that dogs showing anxious behaviors in response to separation are fine and do not seek treatment for their pets," Mendl says, noting that he and his colleagues have validated treatments for dealing with these types of behaviors in past work. "This study suggests that at least some dogs showing separation-related behaviors may have underlying negative emotional states, and owners are encouraged to seek treatment to enhance the welfare of their dogs."

The authors include Michael Mendl, Centre for Behavioural Biology, Department of Clinical Veterinary Science, University of Bristol, Langford, UK; Julie Brooks, Centre for Behavioural Biology, Department of Clinical Veterinary Science, University of Bristol, Langford, UK; Christine Basse, Centre for Behavioural Biology, Department of Clinical Veterinary Science, University of Bristol, Langford, UK; Oliver Burman, Centre for Behavioural Biology, Department of Clinical Veterinary Science, University of Bristol, Langford, UK, University of Lincoln, Lincoln, UK; Elizabeth Paul, Centre for Behavioural Biology, Department of Clinical Veterinary Science, University of Bristol, Langford, UK; Emily Blackwell, Centre for Behavioural Biology, Department of Clinical Veterinary Science, University of Bristol, Langford, UK; and Rachel Casey, at Centre for Behavioural Biology, Department of Clinical Veterinary Science, University of Bristol, Langford, UK.

Whale poop pumps up ocean health

Save the whales, save the fishermen

Whale feces -- should you be forced to consider such matters -- probably conjure images of, well, whale-scale hunks of crud, heavy lumps that sink to the bottom. But most whales actually deposit waste that floats at the surface of the ocean, "very liquidy, a flocculent plume," says University of Vermont whale biologist, Joe Roman.

And this liquid fecal matter, rich in nutrients, has a huge positive influence on the productivity of ocean fisheries, Roman and his colleague, James McCarthy from Harvard University, have discovered.

Their discovery, published Oct. 11 in the journal PLoS ONE, is what Roman calls a "whale pump."

Whales, they found, carry nutrients such as nitrogen from the depths where they feed back to the surface via their feces. This functions as an upward biological pump, reversing the assumption of some scientists that whales accelerate the loss of nutrients to the bottom.

And this nitrogen input in the Gulf of Maine is "more than the input of all rivers combined," they write, some 23,000 metric tons each year.

It is well known that microbes, plankton, and fish recycle nutrients in ocean waters, but whales and other marine mammals have largely been ignored in this cycle. Yet this study shows that whales historically played a central role in the productivity of ocean ecosystems -- and continue to do so despite diminished populations.

Despite the problems of coastal eutrophication -- like the infamous "dead zones" in the Gulf of Mexico caused by excess nitrogen washing down the Mississippi River -- many places in the ocean of the Northern Hemisphere have a limited nitrogen supply.

Including where Roman and McCarthy completed their study: the once fish-rich Gulf of Maine in the western North Atlantic. There, phytoplankton, the base of the food chain, has a brake on its productivity when nitrogen is used up in the otherwise productive summer months. (In other parts of the ocean, other elements are limiting, like iron in some regions of the Southern oceans.)

"We think whales form a really important direct influence on the production of plants at the base of this food web," says McCarthy.

"We found that whales increase primary productivity," Roman says, allowing more phytoplankton to grow, which then "pushes up the secondary productivity," he says, of the critters that rely on the plankton. The result: "bigger fisheries and higher abundances throughout regions where whales occur in high densities," Roman says.

"In areas where whales were once more numerous than they are today, we suggest that they were more productive," say McCarthy.

The numbers of whales that swam the oceans before human harvests began is a question of some controversy. "Conservative estimates are that large whales have been cut to 25 percent," says Roman, "though the work done on whale genetics shows that we're probably closer to 10 percent," of historical levels. To cover the range of possibilities, Roman and McCarthy's study considered several scenarios, estimating current whale stocks as 10, 25, or 50 percent of historical levels.

"Anyway you look at it, whales played a much bigger role in ecosystems in the past than they do now," says Roman, a conservation biologist in the University of Vermont's Rubenstein School of Environment and Natural Resources and the author of a book on whales.

"And everything that we do to enhance recovery and restoration of the great whales to something like pre-harvest levels works against other deleterious effects that humans are causing in the oceans," says McCarthy, like the decline of overall ocean productivity as climate change drives up water temperatures, which, in turn, causes a decline in nutrients for phytoplankton.

A further implication of the new study is that ongoing calls by some governments to relax international whaling restrictions are ill-considered. Culls and bounty programs would reduce nitrogen and "decrease overall productivity," Roman and McCarthy note in their paper, "The Whale Pump: Marine Mammals Enhance Primary Productivity in a Coastal Basin."

"For a long time, and still today, Japan and other countries have policies to justify the harvest of marine mammals," says Roman. These countries argue that whales compete with their commercial fisheries.

"Our study flips that idea on its head," Roman says, "Not only is that competition small or non-existent, but actually the whales present can increase nutrients and help fisheries and the health of systems wherever they are found. By restoring populations we have a chance to glimpse how amazingly productive these ecosystems were in the past."

Trial confirms prostate drug promise

A drug discovered in the UK could help thousands of men with advanced prostate cancer, experts say.

Trials involving men who had exhausted all other treatment options found abiraterone acetate extended life by an average of four months. Researchers hope that in less advanced cases, the benefits could be greater.

The drug's makers, the pharmaceutical firm Janssen, are now seeking a licence which would allow it to be used on the NHS.

Significant benefit

More than 36,000 men are diagnosed with prostate cancer each year in the UK - more than 10,000 die from the disease. If the disease spreads beyond the prostate, a small gland found near the bladder, then it becomes far more difficult to treat. Abiraterone acetate interferes with the production of the hormone testosterone, which can fuel the growth of prostate cancer.

The trials involved more than 1,000 men with very advanced, aggressive cancers, whose prognosis was poor, with only months left to live. The 797 patients given abiraterone plus a steroid lived for an average of 14.8 months, compared to 10.9 months for the remainder who simply got the steroid.

Scans showed that tumour growth halted for longer in the group given the drug.

Another advantage of the drug was the relative lack of side effects compared with chemotherapy or radiotherapy, making it a far more attractive prospect for patients.

The drug was first discovered at the Institute of Cancer Research in London, and its chief executive Professor Peter Rigby said he was "very proud" that men with advanced prostate cancer had this new treatment option.

Other cancer charities, who helped fund research into the drug, also welcomed the study results, presented at the European cancer drug conference ESMO.

John Neate, from the Prostate Cancer Charity, said that the drug represented a "significant move forward".

He said: "These initial findings are particularly important as they offer new hope to men diagnosed with an advanced form of prostate cancer who can quickly run out of treatment options once their tumour stops responding to the existing methods of controlling its progression."

He said that while the full results of the study had yet to be published in medical journals, he hoped that they would provide the evidence needed to allow the drug to be licensed for use in the NHS.

Harpal Kumar from Cancer Research UK, added: "It's certainly a significant improvement in what might be expected for men with such advanced prostate cancer." Pharmaceutical firm Janssen will now apply for a European licence, which would allow UK doctors to prescribe it, although there is no decision yet on how much it should cost. Further trials will look at whether men with slightly less advanced prostate cancer could also benefit from the drug, perhaps even more than those taking part in this study.

What a scientist didn't tell the New York Times about his study on bee deaths

FORTUNE -- Few ecological disasters have been as confounding as the massive and devastating die-off of the world's honeybees. The phenomenon of Colony Collapse Disorder (CCD) -- in which disoriented honeybees die far from their hives -- has kept scientists, beekeepers, and regulators desperately seeking the cause. After all, the honeybee, nature's ultimate utility player, pollinates a third of all the food we eat and contributes an estimated $15 billion in annual agriculture revenue to the U.S. economy.

The long list of possible suspects has included pests, viruses, fungi, and also pesticides, particularly so-called neonicotinoids, a class of neurotoxins that kills insects by attacking their nervous systems. For years, their leading manufacturer, Bayer Crop Science, a subsidiary of the German pharmaceutical giant Bayer AG (BAYRY), has tangled with regulators and fended off lawsuits from angry beekeepers who allege that the pesticides have disoriented and ultimately killed their bees. The company has countered that, when used correctly, the pesticides pose little risk.

A cheer must have gone up at Bayer on Thursday when a front-page New York Times article, under the headline "Scientists and Soldiers Solve a Bee Mystery," described how a newly released study pinpoints a different cause for the die-off: "a fungus tag-teaming with a virus." The study, written in collaboration with Army scientists at the Edgewood Chemical Biological Center outside Baltimore, analyzed the proteins of afflicted bees using a new Army software system. The Bayer pesticides, however, go unmentioned.

What the Times article did not explore -- nor did the study disclose -- was the relationship between the study's lead author, Montana bee researcher Dr. Jerry Bromenshenk, and Bayer Crop Science. In recent years Bromenshenk has received a significant research grant from Bayer to study bee pollination. Indeed, before receiving the Bayer funding, Bromenshenk was lined up on the opposite side: He had signed on to serve as an expert witness for beekeepers who brought a class-action lawsuit against Bayer in 2003. He then dropped out and received the grant.

Reporter: scientist "did not volunteer" funding sources

Bromenshenk's company, Bee Alert Technology, which is developing hand-held acoustic scanners that use sound to detect various bee ailments, will profit more from a finding that disease, and not pesticides, is harming bees. Two years ago Bromenshenk acknowledged as much to me when I was reporting on the possible neonicotinoid/CCD connection for Conde Nast Portfolio magazine, which folded before I completed my reporting.

Bromenshenk defends the study and emphasized that it did not examine the impact of pesticides. "It wasn't on the table because others are funded to do that," he says, noting that no Bayer funds were used on the new study. Bromenshenk vociferously denies that receiving funding from Bayer (to study bee pollination of onions) had anything to do with his decision to withdraw from the plaintiff's side in the litigation against Bayer. "We got no money from Bayer," he says. "We did no work for Bayer; Bayer was sending us warning letters by lawyers."

A Bayer publicist reached last night said she was not authorized to comment on the topic but was trying to reach an official company spokesperson.

The Times reporter who authored the recent article, Kirk Johnson, responded in an e-mail that Dr. Bromenshenk "did not volunteer his funding sources." Johnson's e-mail notes that he found the peer-reviewed scientific paper cautious and that he "tried to convey that caution in my story." Adds Johnson: The study "doesn't say pesticides aren't a cause of the underlying vulnerability that the virus-fungus combo then exploits...."

At least one scientist questions the new study. Dr. James Frazier, professor of entomology at Penn State University, who is currently researching the sublethal impact of pesticides on bees, said that while Bromenshenk's study generated some useful data, Bromenshenk has a conflict of interest as CEO of a company developing scanners to diagnose bee diseases. "He could benefit financially from that if this thing gets popularized," Frazier says, "so it's a difficult situation to deal with." He adds that his own research has shown that pesticides affect bees "absolutely, in multiple ways."

Underlying cause of bee deaths still unclear

Dr. Jennifer Sass, a senior scientist with the health group at the Natural Resources Defense Council, says that while the Bromenshenk/Army study is interesting, it fails to ask the underlying question "Why are colonies

dying? Is it because they're getting weak? People who have HIV don't die of HIV. They die of other diseases they get because their immune systems are knocked off, making them more susceptible." In other words, pesticides could weaken the bees -- and then the virus/fungus combination finishes them off. That notion, however, is not explored in the new study.

In 2008 the NRDC sued the Environmental Protection Agency after it failed to release Bayer's underlying studies on the safety of its neonicotinoids. The federal agency has since changed course, and NRDC researchers are being allowed to sift through the Bayer studies, an NRDC spokesman says.

The EPA has based its approval of neonicotinoids on the fact that the amounts found in pollen and nectar were low enough to not be lethal to the bees -- the only metric they have to measure whether to approve a pesticide or not. But studies have shown that at low doses, the neonicotinoids have sublethal effects that impair bees' learning and memory. The USDA's chief researcher, Jeff Pettis, told me in 2008 that pesticides were definitely "on the list" as a primary stressor that could make bees more vulnerable to other factors, like pests and bacteria.

In 1999, France banned Imidacloprid after the death of a third of its honeybees. A subsequent report prepared for the French agricultural ministry found that even tiny sublethal amounts could disorient bees, diminish their foraging activities, and thus endanger the entire colony. Other countries, including Italy, have banned certain neonicotinoids.

Bayer v. beekeepers

As for the Bayer-Bromenshenk connection, in 2003 a group of 13 North Dakota beekeepers brought a class-action lawsuit against Bayer, alleging that the company's neonicotinoid, Imidacloprid, which had been used in nearby fields, was responsible for the loss of more than 60% of their hives. "My bees were getting drunk," Chris Charles, a beekeeper in Carrington, N.D., and a plaintiff in the lawsuit, told me in 2008. "They couldn't walk a white line anymore -- they just hung around outside the hive. They couldn't work."

Charles and the other North Dakota beekeepers hired Bromenshenk as an expert witness. Bayer did not dispute that Imidacloprid was found among the bees and their hives. The company simply argued that the amount had not been enough to kill them.

As the North Dakota lawsuit moved forward, an expert witness for the beekeepers, Dr. Daniel Mayer, a now retired bee expert from Washington State University, traveled to 17 different bee yards in North Dakota and observed dead bees and bees in the throes of what looked like Imidacloprid poisoning, he told me in 2008. He theorized that after foraging in planted fields where the seeds had been treated with Imidacloprid, the bees then brought the pesticide back to the hive, where it built up in the wax combs.

The beekeepers tried to enlist more expert witnesses, but others declined, according to two of the beekeeper plaintiffs, in large part because they had taken research money from Bayer and did not want to testify against the company. One who agreed -- Bromenshenk -- subsequently backed out and got a research grant from Bayer. Bromenshenk insists the two actions were unrelated. "It was a personal decision," he says. "I, in good conscience, couldn't charge beekeepers for services when I couldn't help them." He adds, "Eventually, the lawyers stopped calling. I didn't quit. They just stopped calling."

In June 2008 a district court judge in Pennsylvania defanged the beekeepers' lawsuit by siding with Bayer to exclude Mayer's testimony and the initial test results from a laboratory in Jacksonville, Fla., that had found significant amounts of Imidacloprid in the honeybee samples.

That same year Bromenshenk brokered a meeting between Bayer and beekeepers. When I interviewed Bromenshenk that year, he said that increasing frustration with the accusations against Bayer, which he described as a "runaway train," led him to contact the company in an effort to create a dialogue between Bayer and the beekeepers. Because of his efforts, in November 2008, Bayer scientists sat down in Lake Tahoe, Nev., with a small group of American beekeepers to establish a dialogue. The issues discussed were "trust and transparency," Bromenshenk told me. "How did Bayer do its testing, and do we trust the results?" Generally beekeepers and scientists have been highly critical of the design of Bayer's studies and deeply suspicious over who is or isn't on Bayer's payroll.

After the meeting, Bayer tentatively agreed to appoint a beekeeper advisory board to help redesign studies so that beekeepers could trust the results. But many beekeepers see the advisory board and grant money as a ruse on Bayer's part to silence its enemies by holding them close. "They have the bee industry so un-united," says Jim Doan, once New York State's busiest beekeeper until CCD decimated his business. "Even the researchers are off working on anything but the pesticide issue."

Bromenshenk's study acknowledges that the research does not "clearly define" whether the concurrent virus and fungus, which were found in all the afflicted bee samples, is "a marker, a cause, or a consequence of CCD." It also notes uncertainty as to how, exactly, the combination kills the bees, and whether other factors like

weather and bee digestion play a role. Scientists like Sass at NRDC believe the mystery is far from resolved: "We're even concerned that based on this, beekeepers will use more pesticides trying to treat these viruses," says Sass.

SETI Participant Claims He Found A Signal From Near Gliese 581 Already

By Hank Created Oct 11 2010 - 5:54pm

Astronomers are certainly not strangers to manipulating public relations through mass media - they write reasonable papers and then encourage the press to go nuts with it. Witness the recent arXiv paper by Vogt, Butler, et al on Gliese 581g, should it even exist, which reads

it is important to keep in mind that, though all 6 planets presented here are well-supported by the calculated reduced chi-squared statistics and also by several different variants of FAP statistics, and the entire 6-planet system is consistent with the combined data set from both teams, caution is warranted as most of the signals are small. And there may yet be unknown systematic errors in either or both data sets.

and then Vogt talking to Discovery News, says

"Personally, given the ubiquity and propensity of life to flourish wherever it can, I would say that the chances for life on this planet are 100 percent. I have almost no doubt about it."

How are those statements even close? Well, they aren't. One is over-the-top conjecture by someone who should know better and one is a paper designed for scientists who would see their B.S. Richter Scales go right to to 8.1 if he said it in a real setting. But once you make it known that promoting space science is more important than reasonable assertions, the floodgates are open.

To wit, astronomer Ragbir Bhathal, a member of the Australian chapter of SETI ("Search for Extra-Terrestrial Intelligence") and a scientist at the University of Western Sydney, claims he detected a strange signal, a 'mysterious pulse of light', in the same area of the galaxy as far back as December, 2008.

For months after his discovery Dr Bhathal scanned the skies for a second signal to see whether it was just a glitch in his instrumentation but his search came to nothing.

Not everyone is buying it, including fellow SETI folk. "I know the scientist, and when he first announced it, I asked him for the details, and he wouldn't send them to me," SETI founder Frank Drake (also of the somewhat misused Drake equation) told SPACE.com. "I'm very suspicious."

What's the harm? If one scientist can claim a 100% chance of life on a planet that may not even actually exist, or could be nothing but solid rock, why can't another discuss a signal from the same area in the popular press?

It's for bigger marketing minds in space science than me to decide. In the meantime, here is Carl Sagan discussing the chances of life out there: ***http://www.youtube.com/watch?v=0Ztl8CG3Sys&feature=player_embedded***

Why it's hard to crash the electric grid

Last March, the U.S. Congress heard testimony about a scientific study in the journal Safety Science. A military analyst worried that the paper presented a model of how an attack on a small, unimportant part of the U.S. power grid might, like dominoes, bring the whole grid down.

Members of Congress were, of course, concerned. Then, a similar paper came out in the journal Nature the next month that presented a model of how a cascade of failing interconnected networks led to a blackout that covered Italy in 2003. These two papers are part of a growing reliance on a particular kind of mathematical model -- a so-called topological model -- for understanding complex systems, including the power grid.

And this has University of Vermont power-system expert Paul Hines concerned.

"Some modelers have gotten so fascinated with these abstract networks that they've ignored the physics of how things actually work -- like electricity infrastructure," Hines says, "and this can lead you grossly astray."

For example, the Safety Science paper came to the "highly counter-intuitive conclusion," Hines says, that the smallest, lowest-flow parts of the electrical system -- say a minor substation in a neighborhood -- were likely to be the most effective spots for a targeted attack to bring down the U.S. grid.

"That's a bunch of hooey," says Seth Blumsack, Hines's colleague at Penn State.

Hines and Blumsack's recent study, published in the journal Chaos on Sept. 28, found just the opposite. Drawing on real-world data from the Eastern U.S. power grid and accounting for the two most important laws of physics governing the flow of electricity, they show that "the most vulnerable locations are the ones that have most flow through them," Hines says. Think highly connected transformers and major power-generating stations. Score one point for common sense.

"If the government takes these topological models seriously," Hines says, "and changes their investment strategy to put walls around the substations that have the least amount of flow -- it would be a massive waste of resources."

Many topological models are, basically, graphs of connected links and nodes that represent the flows and paths within a system. When a node changes or fails, its nearest connected neighbor will often change or fail

next. This abstraction has provided profound insights into many complex systems, like river networks, supply chains, and highway traffic. But electricity is strange and the US electric grid even stranger.

In August of 2003 a blackout started in Ohio and then spread to New York City. Cleveland went down and soon Toronto was affected. The blackout was able to jump over long distances.

"The way topological cascades typically occur -- is they're more like real dominoes," says Hines, an assistant professor in UVM's College of Engineering and Mathematical Sciences. "When you push a domino the only thing that can fall is the one next to it. Whereas in a power grid you might push one domino and the next one to fall might be a hundred miles away."

That's because, "when a transmission line fails -- instantly, at nearly the speed of light, everything changes. Everything that is connected will change just a little bit," Hines says, "But in ways that are hard to predict." This strangeness is compounded by the fact that the U.S. electric grid is more an intractable patchwork of history than a rational design.

Which is why he and Blumsack decided to "run a horse race," he says, between topological models and a physics-based one -- applied to the actual arrangement of the North American Eastern Interconnect, the largest portion of the U.S. electric grid.

Using real-world data from a 2005 North American Electric Reliability Corporation test case, they compared how vulnerable parts of the grid appeared in the differing models. The topological measures -- so-called "characteristic path lengths" and "connectivity loss" between nodes -- came up with dramatically different and less accurate results than a model that calculated blackout size driven by the two rules that most influence actual electric transmissions --Ohm's and Kirchhoff's laws.

In other words, the physics horse won. Or, as their paper concludes, "evaluating vulnerability in power networks using purely topological metrics can be misleading," and "results from physics-based models are more realistic and generally more useful for infrastructure risk assessment." Score one for gritty reality.

An important implication of Hines's work, funded by the National Science Foundation, is that electric grid is probably more secure that many people realize -- because it is so unpredictable. This, of course, makes it hard to improve its reliability (in another line of research, Hines has explored why the rate of blackouts in the United States hasn't improved in decades), but the up-side of this fact is that it would be hard for a terrorist to bring large parts of the grid down by attacking just one small part.

"Our system is quite robust to small things failing -- which is very good," he says, "Even hurricanes have trouble taking out power systems. Hurricanes do cause power system failures, but they don't often take out the whole system."

Blumsack agrees. "Our paper confirms that it would be possible for somebody who wanted to do something disruptive to the power grid to do so," he says. "A lot of the infrastructure is out in the open," which does create vulnerability to planned attack. "But if you wanted to black out half of the U.S., it will be much more difficult than some of these earlier models imply," he says.

"If you were a bad guy, there is no obvious thing to do to take out the power system," Hines says. "What we learned from doing the simulations is that if you take out the biggest substation, with the most flow, you get the biggest failure on average. But there were also a number of cases where, even if you took out the biggest one, you don't get much of a blackout."

"It takes an incredible amount of information," he says, "to really figure out how to make the grid fail."

Moonlighting as a Conjurer of Chemicals

By NATALIE ANGIER

Sir Isaac Newton was a towering genius in the history of science, he knew he was a genius, and he didn't like wasting his time. Born on Dec. 25, 1642, the great English physicist and mathematician rarely socialized or traveled far from home. He didn't play sports or a musical instrument, gamble at whist or gambol on a horse. He dismissed poetry as "a kind of ingenious nonsense," and the one time he attended an opera he fled at the third act. Newton was unmarried, had no known romantic liaisons and may well have died, at the age of 85, with his virginity intact. "I never knew him to take any recreation or pastime," said his assistant, Humphrey Newton, "thinking all hours lost that were not spent on his studies."

No, it wasn't easy being Newton. Not only did he hammer out the universal laws of motion and gravitational attraction, formulating equations that are still used today to plot the trajectories of space rovers bound for Mars; and not only did he discover the spectral properties of light and invent calculus. Sir Isaac had a whole other full-time career, a parallel intellectual passion that he kept largely hidden from view but that rivaled and sometimes surpassed in intensity his devotion to celestial mechanics. Newton was a serious alchemist, who spent night upon dawn for three decades of his life slaving over a stygian furnace in search of the power to transmute one chemical element into another.

Newton's interest in alchemy has long been known in broad outline, but the scope and details of that moonlighting enterprise are only now becoming clear, as science historians gradually analyze and publish Newton's extensive writings on alchemy — a million-plus words from the Newtonian archives that had previously been largely ignored.

Speaking last week at the Perimeter Institute for Theoretical Physics in Waterloo, Ontario, William Newman, a professor of the history and philosophy of science at Indiana University in Bloomington, described his studies of Newton's alchemical oeuvre, and offered insight into the central mystery that often baffles contemporary Newton fans. How could the man who vies in surveys with Albert Einstein for the title of "greatest physicist ever," the man whom James Gleick has aptly designated "chief architect of the modern world," have been so swept up in what looks to modern eyes like a medieval delusion? How could the ultimate scientist have been seemingly hornswoggled by a totemic psuedoscience like alchemy, which in its commonest rendering is described as the desire to transform lead into gold? Was Newton mad — perhaps made mad by exposure to mercury, as some have proposed? Was he greedy, or gullible, or stubbornly blind to the truth?

In Dr. Newman's view, none of the above. Sir Isaac the Alchemist, he said, was no less the fierce and uncompromising scientist than was Sir Isaac, author of the magisterial Principia Mathematica. There were plenty of theoretical and empirical reasons at the time to take the principles of alchemy seriously, to believe that compounds could be broken down into their basic constituents and those constituents then reconfigured into other, more desirable substances.

Miners were pulling up from the ground twisted bundles of copper and silver that were shaped like the stalks of a plant, suggesting that veins of metals and minerals were proliferating underground with almost florid zeal.

Pools found around other mines seemed to have extraordinary properties. Dip an iron bar into the cerulean waters of the vitriol springs of modern-day Slovakia, for example, and the artifact will emerge agleam with copper, as though the dull, dark particles of the original had been elementally reinvented. "It was perfectly reasonable for Isaac Newton to believe in alchemy," said Dr. Newman. "Most of the experimental scientists of the 17th century did."

Moreover, while the alchemists of the day may not have mastered the art of transmuting one element into another — an ordeal that we have since learned requires serious equipment like a particle accelerator, or the belly of a star — their work yielded a bounty of valuable spinoffs, including new drugs, brighter paints, stronger soaps and better booze. "Alchemy was synonymous with chemistry," said Dr. Newman, "and chemistry was much bigger than transmutation."

For Newton, alchemy may also have proved bigger than chemistry. Dr. Newman argues that Sir Isaac's alchemical investigations helped yield one of his fundamental breakthroughs in physics: his discovery that white light is a mixture of colored rays, and that a sunbeam prismatically fractured into the familiar rainbow suite called Roy G. Biv can with a lens be resolved to tidy white sunbeam once again. "I would go so far as to say that alchemy was crucial to Newton's breakthroughs in optics," said Dr. Newman. "He's not just passing light through a prism — he's resynthesizing it." Consider this a case of "technology transfer," said Dr. Newman, "from chemistry to physics."

The conceptual underpinning to the era's alchemical fixation was the idea of matter as hierarchical and particulate — that tiny, indivisible and semipermanent particles come together to form ever more complex and increasingly porous substances, a notion not so different from the reality revealed by 20th-century molecular biology and quantum physics.

With the right solvents and the perfect reactions, the researchers thought, it should be possible to reduce a substance to its core constituents — its corpuscles, as Newton called them — and then prompt the corpuscles to adopt new configurations and programs. Newton and his peers believed it was possible to prompt metals to grow, or "vegetate," in a flask. After all, many chemical reactions were known to leave lovely dendritic residues in their wake. Dissolve a pinch of silver and mercury in a solution of nitric acid, drop in a lump of metal amalgam, and soon a spidery, glittering "Tree of Diana" will form on the glass. Or add iron to hydrochloric acid and boil the solution to dryness. Then prepare a powdery silicate mix of sand and potassium carbonate. Put the two together, and you will have a silica garden, in which the ruddy ferric chloride rises and bifurcates, rises and bifurcates, as though it were reaching toward sunlight and bursting into bloom.

Add to this the miners' finds of tree- and rootlike veins of metals and alchemists understandably concluded that metals must be not only growing underground, but ripening. Hadn't twined ores of silver and lead been found? Might not the lead be halfway to a mature state of silverdom? Surely there was a way to keep the disinterred metal root balls sprouting in the lab, coaxing their fruit to full succulent ripeness as the noblest of metals — lead into silver, copper to gold?

Well, no. If mineral veins sometimes resemble botanical illustrations, blame it on Earth's molten nature and fluid mechanics: when seen from above, a branching river also looks like a tree.

Yet the alchemists had their triumphs, inventing brilliant new pigments, perfecting the old — red lead oxide, yellow arsenic sulfide, a little copper and vinegar and you've got bright green verdigris. Artists were advised, forget about mixing your own colors: you can get the best from an alchemist. The chemistry lab replaced the monastery garden as a source of new medicines. "If you go to the U.K. today and use the word 'chemist,' the assumption is that you're talking about the pharmacist," said Dr. Newman. "That tradition goes back to the 17th century."

Alchemists also became expert at spotting cases of fraud. It was a renowned alchemist who proved that the "miraculous" properties of vitriol springs had nothing to do with true transmutation. Instead, the water's vitriol, or copper sulfate, would cause iron atoms on the surface of a submerged iron rod to leach into the water, leaving pores that were quickly occupied by copper atoms from the spring.

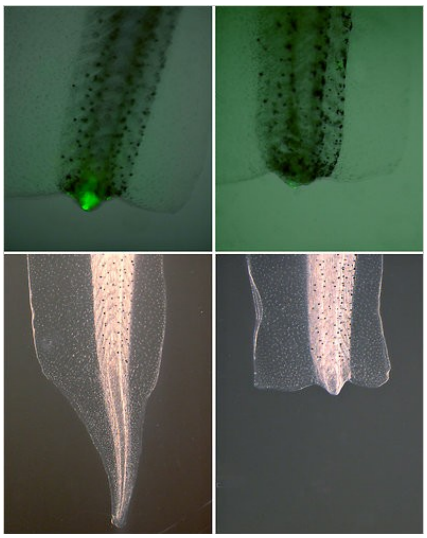
"There were a lot of charlatans, especially in the noble courts of Europe," said Dr. Newman. Should an alchemist be found guilty of attempting to deceive the king, the penalty was execution, and in high gilded style. The alchemist would be dressed in a tinsel suit and hanged from a gallows covered in gold-colored foil.

Newton proved himself equally intolerant of chicanery, when, in his waning years, he took a position as Master of the Mint. "In pursuing clippers and counterfeiters, he called on long-nurtured reserves of Puritan anger and righteousness," writes James Gleick in his biography of Newton.

"He was brutal," said Mark Ratner, a materials chemist at Northwestern University. "He sentenced people to death for trying to scrape the gold off of coins." Newton may have been a Merlin, a Zeus, the finest scientist of all time. But make no mistake about it, said Dr. Ratner. "He was not a nice guy."

Salt Infusion Could Be a Remedy for Damaged Cells

By SINDYA N. BHANOO



It turns out a dash of salt can really do a body, especially a tail, some good.

An infusion of sodium helped tadpoles regenerate amputated tails, according to a paper in the Journal of Neuroscience. The finding is significant because further study could help scientists develop medical treatments for spinal cord damage or limb loss in humans, the study's authors wrote.

The scientists administered a drug to the tadpoles that rushed an influx of sodium ions to the injured cells.

They found that a salt stimulus prompted regeneration as late as 18 hours after amputation. Tissues normally do not regenerate so many hours after the damage is done, and particularly after scar tissue forms.

Although young tadpoles can naturally regenerate lost tails, this ability diminishes with age. Sodium ions also appear to reactivate this ability, said Michael Levin, a biologist at Tufts University and one of the study's authors.

Biologists have regenerated tadpoles' severed tails by allowing a flow of sodium ions to reach injured cells. The new growth is seen in the images at left. **Ai-Sun Tseng and Michael Levin/Tufts University**

One particular ion channel in the tadpoles, which is called NaV1.2, is responsible for transporting sodium to damaged cells for the purpose of regeneration, the researchers discovered. When this channel is blocked, thereby inhibiting sodium that would otherwise naturally travel to the damaged cells, there is regenerative failure.

If a regenerative treatment could be developed for humans, it would transform the medical field. Children can naturally regrow fingers, but adults cannot. Further study is also needed to understand why salt generates regrowth and what the potential side effects are of a sodium infusion.

Mental Health: Fog May Be From Cancer, Not the Chemo

By RONI CARYN RABIN

Cancer survivors often complain about "chemo brain," a mental fog and inability to concentrate that persist long after treatment. But the problem may not be limited to cancer patients who undergo chemotherapy, a study suggests.

Researchers analyzed data gathered from 2001 to 2006 by the National Health and Nutrition Examination Survey on 9,819 adults ages 40 and older, of whom 1,305 reported a history of cancer.

Participants answered questions including "Are you limited in any way because of difficulty remembering or because you experience periods of confusion?"

While 8 percent of the respondents who had never had cancer reported impairment, 14 percent of those with a history of cancer reported problems.
After controlling for differences between the groups, like age, education and overall health, researchers concluded that people with a history of cancer were 40 percent more likely to report memory impairment.
“These problems may be related to treatment, such as chemotherapy, radiation or hormonal therapy, or to something about the disease itself which can change brain chemistry, or to psychological distress,” said Pascal Jean-Pierre, of the University of Miami Miller School of Medicine, who presented the findings at an American Association for Cancer Research conference in Miami.

Promising treatments might include behavioral interventions and medications like antidepressants, said Dr. Jean-Pierre, adding that his study shows “this is a serious national problem.”

Rotten experiments help to create picture of our early ancestors

How can watching primitive fish rot away reveal answers to the fundamental questions of how, when and why our earliest vertebrate ancestors evolved?

An innovative experiment at the University of Leicester that involved studying rotting fish has helped to create a clearer picture of what our early ancestors would have looked like.

The scientists wanted to examine the decaying process in order to understand the decomposition of soft-body parts in fish. This in turn will help them reconstruct an image of creatures that existed 500 million years ago.

Their findings have been published today, Wednesday 13th October, in the journal Proceedings of the Royal Society B. The work was funded by the Natural Environment Research Council (NERC).

The researchers, from the Department of Geology at the University of Leicester, studied the way primitive fish, such as hagfishes and lampreys, decompose to gain an impression of our early ancestry.

The team at Leicester (Rob Sansom, Sarah Gabbott and Mark Purnell) explain: "Our earliest fish-like relatives left fossil remains which have the potential to show us how the group to which we belong evolved from worm-like relatives. But there is a major problem - people are familiar with bones, and teeth as fossils but do not perhaps realise that before these inventions our ancestors consisted of entirely soft bodied creatures. Eyes, organs, guts and muscles all decompose very quickly after death, and as any forensic scientist knows recognising rotted anatomy is difficult.

"Fossils from 500 million years ago provide our only direct evidence of how our earliest vertebrate ancestors evolved from the simple worm-like animals".

The fossils from the early phase of vertebrate evolution are very rare because being completely soft-bodied they normally rotted away completely after death leaving nothing behind. But very occasionally their remains became preserved as fossils giving us a tantalising glimpse of our early vertebrate relatives.

However, as Rob Sansom explains correctly reading and reconstructing what our ancestors looked like from these semi-rotted remains is tricky. "Interpreting half-a-billion year old fossils is challenging enough in itself, but even more so when the remains comprise only the decayed soft parts which may look quite different to how they would have done in life".

Sarah Gabbott, one of the leaders of the study, admits that at first it may be difficult to see why spending hundreds of hours studying the stinking carcasses of rotting fish helps us to unlock our evolutionary history, but she points out that the results have been critical to correctly reading fossils from this phase in our history. "In a way our experiments are similar to those going on at the infamous 'body farms' in the USA, where human cadavers are left to decompose so that forensic scientists can determine time and cause of death. But, as palaeontologists we want to uncover what an animal which lived 500 million years ago looked like before it died".

"Our macabre experiments are grisly and smelly but they have revealed, for the first time, what characteristic vertebrate features look like when they are partially decomposed".

Rare fossilized fish-like fossils are recognised as being part of our evolutionary history because they possess characteristic anatomical features, such as a tail, eyes and the precursor of a backbone. Mark Purnell, explains further: "our experiments have provided us with a set of photofit-like images allowing us to decipher and correctly identify features in fossils. Our ability to flesh out what our earliest vertebrate ancestors looked like and correctly place them on the Tree of Life is critical to understanding whether our earliest relatives evolved in a burst of complexity or gradually over millions of years"

The results published today in The Proceedings of the Royal Society B, show that some of the characteristic anatomical features of early vertebrate fossils have been badly affected by decomposition, and in some cases may have rotted away completely. Knowing how decomposition affected the fossils means our reconstructions of our earliest ancestors will be more scientifically accurate.

Melanoma drug shrinks brain metastases in phase I/II study

A new drug being developed to treat potentially deadly melanoma skin cancers has shown a promising ability to shrink secondary tumors, known as metastases, in the brain in patients with advanced forms of the disease, Australian researchers report.

At the 35th Congress of the European Society for Medical Oncology (ESMO), Dr Georgina Long from Melanoma Institute Australia and Westmead Hospital, in Sydney, reported the results in a subgroup of 10 melanoma patients with previously untreated brain metastases from the international Phase I/II trial with the oral drug GSK2118436.

"Brain metastases in melanoma are a major unsolved problem," Dr Long said. "We are very excited about the robust activity seen with GSK2118436 in this Phase I/II trial so far. Until now, melanoma has been notoriously resistant to drug therapy in general, and responses in highly lethal brain metastases are particularly uncommon."

Of all solid tumors, melanoma has the greatest capacity to spread via the blood stream to the brain. Overall, 15 to 20% of patients with melanoma that has spread beyond the skin have brain metastases at initial diagnosis, and nearly 75% have them at autopsy.

Currently, there is no evidence that any therapy prolongs survival in patients with multiple melanoma brain metastases. The median overall survival time for all patients with melanoma brain metastases is 16 weeks from diagnosis of brain involvement.

Dr Long and colleagues are testing GSK2118436 as a potential treatment for melanoma patients who have a particular common mutation of the gene for a protein called BRAF, which is mutated in 50% of human melanomas. The drug binds to the activated form of the BRAF protein in the melanoma cell, causing the cell to stop proliferating, and in many cases, die.

The data being presented at ESMO comes from a sub-group of 10 trial participants with previously untreated brain metastases. All 10 patients experienced control of melanoma brain metastases, and 9 of the 10 patients had reductions in the overall size of their brain metastases, Dr Long reported. The overall reductions ranged from 20 to 100% of brain metastases that were 3mm or larger in diameter before treatment.

In this Phase I/II trial, this drug showed a similar effect in patients with melanoma outside the brain, Dr Long said. "We have previously reported a response rate of more than 60% which is unusually good."

"The ability to inhibit oncogenic BRAF is the most important development in the history of drug treatment of melanoma," Dr Long added. "Providing these early data are supported in larger cohorts of patients, and durable responses are confirmed, this activity in the brain may assist in addressing a large unmet need in patients with metastatic melanoma."

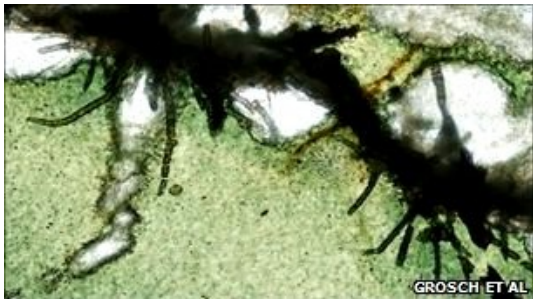
The Australian researchers expect to present an update of activity and safety in all subjects of the Phase I/II trial in November 2010 at the meeting of the Society for Melanoma Research in Sydney. They are also planning a Phase II study of the drug in melanoma patients with V600 BRAF mutant metastatic melanoma involving the brain. They hope to open that second trial in November or December 2010.

Provided by European Society for Medical Oncology

Tiny tubes point to ancient life

By Jonathan Amos Science correspondent, BBC News

Tiny tubes thought to have been etched into South African rocks by microbes are at least 3.34 billion years old, scientists can confirm.



A new analysis of the material filling the structures shows they were created not long after the volcanic rock itself was spewed on to the seafloor. The tubules could therefore represent the earliest "trace" evidence of activity by life on Earth.

The dating work is reported in Earth and Planetary Science Letters.

It is a follow-up study to the University of Bergen team's discovery of the microscopic tunnels and pits first published in 2004.

The structures are seen in rocks from the famous Barberton Greenstone Belt in the Mpumalanga Province of South Africa.

Microbial tunnels in subseafloor meta-volcanic glass from the Hooggenoeg Complex of the Barberton Greenstone belt, South Africa (Grosch et al. 2009) The microscopic structures are thought to have been cut by ancient microbes

These rocks were originally erupted underwater but over the course of Earth history have been lifted on to dry land. The basalt that forms the rock had previously been dated to 3.47-3.45 billion years old, but there was some doubt about when the tubules themselves were created.

By comparing the ratio of different types, or isotopes, of uranium and lead atoms in the material that now fills these tunnels, the team can show they must have been etched by about 3.34 billion years ago - in other words, very soon after the host rock itself was formed.

The issue of when life first appeared on our planet is a hotly debated topic. The constant recycling of rock means there are very few locations like Barberton where a physical record of the ancient Earth can still be examined. Some researchers argue that the peculiar chemistry of rocks at Isua in Greenland betrays the presence of bacteria some 3.8 billion years ago.

What is different about Barberton is that this geochemical signal is also supported by shapes and textures - so-called trace fossils - in the rock which could have been cut by the ancient microbes.

It is not the same as having the "body" fossils of the organism, but researchers can make a strong case that the shapes have a biological origin if they can point to similar tubules made by modern microbes. The Bergen team believes it can do this.

"We're kind of looking at their 'footprints' - we're looking at the holes, the microborings, left by the bugs as they dissolved into, or 'chewed', into the rocks," explained Dr Nicola McLoughlin from Bergen's Centre for Geobiology.

"So instead of looking at the microbe itself, you're looking at the cavity or hole that it makes. We're still working to convince people of the biogenicity of these things and we think we have really good constraints on the modern seafloor," she told BBC News.

"But things get more difficult in the ancient [setting] because the shapes are simpler and the chemistry has been modified. What this paper does show, however, is the progress we have made in dating these structures."

The Barberton rocks in which the tubules were first identified were found at the surface. The University of Bergen is now analysing rocks that have been drilled from deep underground.

At the very least, this type of investigation will researchers more about what conditions were like on Earth almost 3.5 billion years ago.

Human Ancestors Hunted by Prehistoric Beasts

Early humans appear to have occupied a much lower link of the food chain than their modern counterparts.

By Jennifer Viegas | Tue Oct 12, 2010 04:15 PM ET

Early humans may have evolved as prey animals rather than as predators, suggest the remains of our prehistoric primate ancestors that were devoured by hungry birds and carnivorous mammals.

The discovery of multiple de-fleshed, chomped and gnawed bones from the extinct primates, which lived 16 to 20 million years ago on Rusinga Island, Kenya, was announced today at the Society of Vertebrate Paleontology's 70th Anniversary Meeting in Pittsburgh.

At least one of the devoured primates, an early ape called Proconsul, is thought to have been an ancestor to both modern humans and chimpanzees. It, and other primates on the island, were also apparently good eats for numerous predators.

"I have observed multiple tooth pits and probable beak marks on these fossil primates, which are direct evidence for creodonts and raptors consuming these primates," researcher Kirsten Jenkins told Discovery News.

Creodonts were ancient carnivorous mammals that filled a niche similar to that of modern carnivores, but are unrelated to today's meat eaters, she explained. The Rusinga Island creodonts that fed on our primate ancestors were likely wolf-sized.

"There is one site on Rusinga Island with multiple Proconsul individuals all together and these are covered in tooth pits," added Jenkins, a University of Minnesota anthropologist. "This kind of site was likely a creodont den or location where prey could be easily acquired."

Analysis of tooth pits, de-fleshing marks, bone breakage patterns, gnawing and other damage to the primate bones indicate that raptors were also hunting down these distant relatives of humans.

"Primatologists have observed large raptors taking monkeys from trees," Jenkins said. "When a raptor approaches a group of monkeys, those monkeys will make alarm calls to warn their group and attempt to retreat to lower branches. The primates on Rusinga had monkey-like postcrania and likely had very similar locomotor behavior."

The study presents the first evidence of raptor predation on fossil primates from Rusinga, which was part of the side of a large volcano 20 million years ago. Multiple ash layers suggest that eruptions killed countless animals from time to time. But when the volcano was inactive, the site supported a wooded area.

Jenkins is not certain what selective pressures predators placed on these very early primate ancestors to humans, but she said they "can affect behavior, group structure, body size and ontogeny (the life cycle of a single organism)."

Robert Sussman, professor of physical anthropology at Washington University in St. Louis, has long argued that primates, including early humans, evolved not as hunters but as prey of many predators, including wild dogs and cats, hyenas, eagles and crocodiles.

"Despite popular theories posed in research papers and popular literature, early man was not an aggressive killer," said Sussman, author of the book "Man the Hunted: Primates, Predators and Human Evolution." "Our intelligence, cooperation and many other features we have as modern humans developed from our attempts to out-smart the predator."

He added that the idea of man as hunter "developed from a basic Judeo-Christian ideology of man being inherently evil, aggressive and a natural killer." "In fact, when you really examine the fossil and living non-human primate evidence, that is just not the case," he explained.

Jenkins and her colleagues continue to excavate at Rusinga and nearby Mfangano islands, hoping to find more fossils -- especially those from birds -- so that the scientists can identify the species that were hunting the prehistoric primates.

Prenatal treatment of congenital toxoplasmosis could reduce the risk of brain damage

Prenatal treatment of congenital toxoplasmosis with antibiotics might substantially reduce the proportion of infected fetuses that develop serious neurological sequelae (brain damage, epilepsy, deafness, blindness, or developmental problems) or die, and could be particularly effective in fetuses whose mothers acquired Toxoplasma gondii, the parasite that causes toxoplasmosis, during the first third of pregnancy. These are the findings of an observational study by Ruth Gilbert from the UCL Institute of Child Health, London, UK, and colleagues and published in this week's PLoS Medicine.

Toxoplasmosis is a very common parasitic infection but most infected people never know they have the disease. However, about a quarter of women who are infected with toxoplasmosis during pregnancy transmit the parasite to their fetus. The authors followed 293 children in six European countries in whom congenital toxoplasmosis had been identified by prenatal screening (France, Austria, and Italy) or by neonatal screening (in Denmark, Sweden, and Poland). Two-thirds of the children received prenatal treatment for toxoplasmosis with the antibiotics spiramycin or pyrimethamine-sulfonamide.

23 (8% of the fetuses) developed serious neurological sequelae or died, nine of which were terminated during pregnancy. By comparing the number of children who had serious neurological sequelae who received prenatal treatment with the number among children who did not receive prenatal treatment, the authors estimated that prenatal treatment of congenital toxoplasmosis reduced the risk of serious neurological sequelae by three-quarters. Furthermore, they found that to prevent one case of serious neurological sequelae after maternal infection at 10 weeks of pregnancy, it would be necessary to treat three fetuses with confirmed infection and to prevent one case of SNSD after maternal infection at 30 weeks of pregnancy, 18 infected fetuses would need to be treated. The authors also found that that the effectiveness of the antibiotics used, pyrimethamine-sulfonamide and the less toxic spiramycin, was similar.

The authors explain how these results should be interpreted. They conclude: "The finding that prenatal treatment reduced the risk of [serious neurological sequelae] in infected fetuses should be interpreted with caution because of the low number of [serious neurological sequelae] cases and uncertainty about the timing of maternal seroconversion." The authors add: "As these are observational data, policy decisions about screening require further evidence from a randomized trial of prenatal screening and from cost-effectiveness analyses that take into account the incidence and prevalence of maternal infection."

More information: Cortina-Borja M, Tan HK, Wallon M, Paul M, Prusa A, et al. (2010) Prenatal Treatment for Serious Neurological Sequelae of Congenital Toxoplasmosis: An Observational Prospective Cohort Study. PLoS Med 7(10): e1000351. doi:10.1371/journal.pmed.1000351

Compound in celery, peppers reduces age-related memory deficits

CHAMPAIGN, Ill. — A diet rich in the plant compound luteolin reduces age-related inflammation in the brain and related memory deficits by directly inhibiting the release of inflammatory molecules in the brain, researchers report. Luteolin (LOOT-ee-oh-lin) is found in many plants, including carrots, peppers, celery, olive oil, peppermint, rosemary and chamomile. The new study, which examined the effects of dietary luteolin in a mouse model of aging, appears in the Journal of Nutrition.

The researchers focused on microglial cells, specialized immune cells that reside in the brain and spinal cord. Infections stimulate microglia to produce signaling molecules, called cytokines, which spur a cascade of chemical changes in the brain. Some of these signaling molecules, the inflammatory cytokines, induce "sickness behavior": the sleepiness, loss of appetite, memory deficits and depressive behaviors that often accompany illness.

Inflammation in the brain also appears to be a key contributor to age-related memory problems, said University of Illinois animal sciences professor Rodney Johnson, who led the new study. Johnson directs the Division of Nutritional Sciences at Illinois. "We found previously that during normal aging, microglial cells become dysregulated and begin producing excessive levels of inflammatory cytokines," he said.

"We think this contributes to cognitive aging and is a predisposing factor for the development of neurodegenerative diseases."

Johnson has spent nearly a decade studying the anti-inflammatory properties of nutrients and various bioactive plant compounds, including luteolin. Previous studies – by Johnson's lab and others – have shown that luteolin has anti-inflammatory effects in the body. This is the first study to suggest, however, that luteolin improves cognitive health by acting directly on the microglial cells to reduce their production of inflammatory cytokines in the brain.

The researchers showed that microglial cells that were exposed to a bacterial toxin produced inflammatory cytokines that could kill neurons. When the microglia were exposed to luteolin before they encountered the toxin, however, the neurons lived. "The neurons survived because the luteolin inhibited the production of neurotoxic inflammatory mediators," Johnson said.

Exposing only the neurons to luteolin before the experiment had no effect on their survival, the researchers found. "This demonstrated that luteolin isn't protecting the neurons directly," he said. "It's doing it by affecting the microglial cells."

The researchers next turned their attention to the effects of luteolin on the brains and behavior of adult (3- to 6-month-old) and aged (2-year-old) mice. The mice were fed a control diet or a luteolin-supplemented diet for four weeks. The researchers assessed their spatial memory and measured levels of inflammatory markers in the hippocampus, a brain region that is important to memory and spatial awareness.

Normally, aged mice have higher levels of inflammatory molecules in the hippocampus and are more impaired on memory tests than younger adult mice. Aged mice on the luteolin-supplemented diet, however, did better on the learning and memory task than their peers, and the levels of inflammatory cytokines in their brains were more like those of the younger adult mice.

"When we provided the old mice luteolin in the diet it reduced inflammation in the brain and at the same time restored working memory to what was seen in young cohorts," Johnson said.

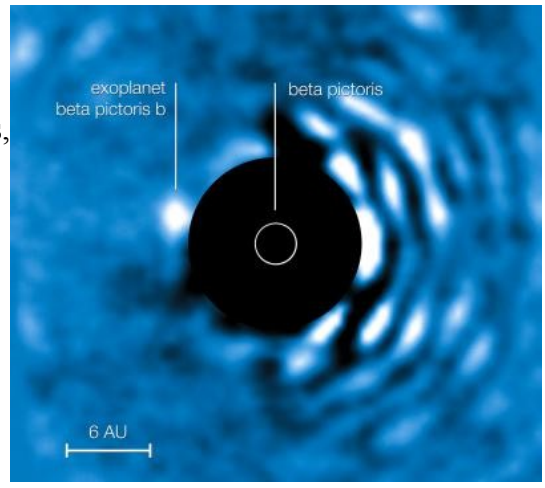
Studies have shown that plant compounds such as luteolin can get into the brain, Johnson said. "We believe dietary luteolin accesses the brain and inhibits or reduces activation of microglial cells and the inflammatory cytokines they produce. This anti-inflammatory effect is likely the mechanism which allows their working memory to be restored to what it was at an earlier age."

"These data suggest that consuming a healthy diet has the potential to reduce age-associated inflammation in the brain, which can result in better cognitive health," he said.

Planet hunters no longer blinded by the light

UA astronomers have developed a way to see faint planets previously hidden in their star's glare. The new mode enables scientists to search for planets closer to the star than has been previously possible

Using new optics technology developed at the University of Arizona's Steward Observatory, an international team of astronomers has obtained images of a planet on a much closer orbit around its parent star than any other extrasolar planet previously found.



The discovery, published online in Astrophysical Journal Letters, is a result of an international collaboration among the Steward Observatory, the Swiss Federal Institute of Technology Zurich, the European Southern Observatory, Leiden University in the Netherlands and Germany's Max-Planck-Institute for Astronomy.

Installed on the European Southern Observatory's Very Large Telescope, or VLT, atop Paranal Mountain in Chile, the new technology enabled an international team of astronomers to confirm the existence and orbital movement of Beta Pictoris b, a planet about seven to 10 times the mass of Jupiter, around its parent star, Beta Pictoris, 63 light years away.

The planet Beta Pictoris b imaged using the Apodizing Phase Plate coronagraph. The "bad" (bright) side of the image is visible to the right while the central bright regions of the central star (Beta Pictoris) have been masked out to enable the viewer to clearly see the planet to the left of the star. **Credit: European Southern Observatory (ESO)**

At the core of the system is a small piece of glass with a highly complex pattern inscribed into its surface. Called an Apodizing Phase Plate, or APP, the device blocks out the starlight in a very defined way, allowing planets to show up in the image whose signals were previously drowned out by the star's glare.

This technique opens new doors in planet discovery," said Phil Hinz, director of the UA's Center for Astronomical Adaptive Optics at Steward Observatory. "Until now, we only were able to look at the outer planets in a solar system, in the range of Neptune's orbit and beyond. Now we can see planets on orbits much closer to their parent star."

In other words, if alien astronomers in another solar system were studying our solar system using the technology previously available for direct imaging detection, all they would see would be Uranus and Neptune. The inner planets, Mercury, Venus, Earth, Mars and Saturn, simply wouldn't show up in their telescope images.

To put the power of the new optics system in perspective: Neptune's mean distance from the sun is about 2.8 billion million miles, or 30 Astronomical Units, or AUs. One AU is defined as the mean distance between the sun and the Earth.

The newly imaged planet, Beta Pictoris b, orbits its star at about seven AUs, a distance where things get especially interesting, according to Hinz, "because that's where we believe the bulk of the planetary mass to be in most solar systems. Between five and 10 AUs."

While planet hunters have used a variety of indirect methods to detect the "footprints" of extrasolar planets – planets outside our solar system – for example the slight gravitational wobble an orbiting planet induces in its parent star, very few of them have been directly observed.

According to Hinz, the growing zoo of extrasolar planets discovered to date – mostly super-massive gas giants on wide orbits – represents a biased sample because their size and distance to their parent star makes them easier to detect.

Similar in size and shape to a cough drop, the Apodizing Phase Plate causes light waves coming from a star to interfere with each other, exposing the faint glow of a nearby planet. Shown here is an early version. **Credit: University of Arizona**

"You could say we started out by looking at oddball solar systems out there. The technique we developed allows us to search for lower-mass gas giants about the size of Jupiter, which are more representative of what is out there." He added: "For the first time, we can search around bright, nearby stars such as Alpha Centauri, to see if they have gas giants."

The breakthrough, which may allow observers to even block out starlight completely with further refinements, was made possible through highly complex mathematical modeling.

"Basically, we are canceling out the starlight halo that otherwise would drown out the light signal of the planet," said Johanan (John) Codona, a senior research scientist at the UA's Steward Observatory who developed the theory behind the technique, which he calls phase-apodization coronagraphy.

"If you're trying to find something that is thousands or a million times fainter than the star, dealing with the halo is a big challenge."

To detect the faint light signals from extrasolar planets, astronomers rely on coronagraphs to block out the bright disk of a star, much like the moon shielding the sun during an eclipse, allowing fainter, nearby objects to show up.

Using his own unconventional mathematical approach, Codona found a complex pattern of wavefront ripples, which, if present in the starlight entering the telescope, would cause the halo part to cancel out but leave the star image itself intact. The Steward Observatory team used a machined piece of infrared optical glass about the size and shape of a cough drop to introduce the ripples. Placed in the optical path of the telescope, the APP device steals a small portion of the starlight and diffracts it into the star's halo, canceling it out.

"It's a similar effect to what you would see if you were diving in the ocean and looked at the sun from below the surface," explained Sascha Quanz from the Swiss Federal Institute of Technology's Institute for Astonomy, the lead author of the study. "The waves on the surface bend the light rays and cause the sky and clouds to appear quite different. Our optic works in a similar way."

In order to block out glare from a star, conventional coronagraphs have to be precisely lined up and are highly susceptible to disturbance. A soft night breeze vibrating the telescope might be all it takes to ruin the image. The APP, on the other hand, requires no aiming and works equally well on any stars or locations in the image.

"Our system doesn't care about those kinds of disturbances," Codona said. "It makes observing dramatically easier and much more efficient."

In the development of APP, Codona was joined by Matt Kenworthy (now at Leiden Observatory in the Netherlands). Hinz, who is a member of the instrument upgrade team for the VLT, played a key role in the technique's implementation on the 6.5 Meter Telescope on Mount Hopkins in Southeastern Arizona.

Former UA astronomy professor Michael Meyer, now at the Swiss Federal Institute of Technology Zurich, where he led the group implementing the technology on the VLT, pointed out that APP is likely to advance areas of research in addition to the hunt for extrasolar planets.

"It will be exciting to see how astronomers will use the new technology on the VLT, since it lends itself to other faint structures around young stars and quasars, too."

Low beta blocker dose can put patients at risk for subsequent heart attacks

Northwestern Medicine cardiologist part of breakthrough study of myocardial infarctions

CHICAGO – For nearly 40 years a class of drugs known as beta blockers have been proven to increase patients' survival prospects following a heart attack by decreasing the cardiac workload and oxygen demand on the heart. In a breakthrough study released in the American Heart Journal, Northwestern Medicine cardiologist Jeffrey J. Goldberger found the majority of patients are frequently not receiving a large enough dose of these drugs, which can put their recovery from heart attacks and overall health into peril.

"Only 46% of patients studied were taking 50% or more of the target dose of beta blockers shown to be beneficial in clinical trials," said Goldberger, director of cardiac electrophysiology research for the Bluhm Cardiovascular Institute of Northwestern Memorial Hospital and a professor of medicine at Northwestern University Feinberg School of Medicine. "Furthermore, 76% of patients were still being treated with the same amount of medication given at discharge. This means that for the vast majority of patients, there wasn't even an attempt to increase their dose."

Goldberger added that patients not getting the right amount of beta blockers is a problem nationwide. "Beta blockers work to keep patients alive after a heart attack, so proper dosing of beta blockers can save many lives," said Goldberger.

Northwestern Memorial was one of 19 sites that participated in the PACEmaker and Beta-blocker Therapy Post-Myocardial Infarction (PACEMI) Trial Registry. Nearly 2,000 patients, who had been treated for a heart attack, were enrolled across the sites. Study participants were prescribed very low doses at discharge, in part to assess how their bodies were likely to react to the drug. Researchers then followed up with patients three weeks later to determine if their personal physicians had adjusted the dosage amount.

"One of the reasons for the low dosage at discharge from the hospital can be attributed to patients' shorter length of hospital stay," said Goldberger. "Better communication between patients and their personal physicians would help ensure patients are receiving the appropriate dose of beta blockers more quickly. Patients can be in and out of the hospital within two days after a heart attack, and this short amount of time doesn't allow for us to increase their medication to the target dose while they are still here."

Goldberger added that there is not yet a system in place for what should happen as an outpatient that used to happen as an inpatient.

"Patients might see one doctor in the hospital but a different one in the office, and those two might not be conferring on the appropriate amount of beta blockers the patient should be taking," said Goldberger.

These findings make it clear, Goldberger added, that patients and their personal physicians need to work together and have better communication.

"Patients also need to schedule an initial doctor's appointment following their discharge within two weeks, so that doctors can adjust the amount of medication in a timely fashion," said Goldberger. "I would expect 70-80% of patients to achieve 50% or more of the target dose."

Researchers develop method for curbing growth of crystals that form kidney stones

Researchers have developed a method for curbing the growth of crystals that form cystine kidney stones. Their findings, which appear in the latest issue of the journal Science, may offer a pathway to a new method for the prevention of kidney stones.

The study was conducted by researchers at New York University's Department of Chemistry and its Molecular Design Institute, NYU School of Medicine, and the Medical College of Wisconsin.

Kidney stones comprised of L-cystine affect at least 20,000 individuals in the United States. This number is substantially smaller than the 10 percent of Americans afflicted by calcium oxalate monohydrate (COM) stones. But L-cystine stones are larger, recur more frequently, and are more likely to cause chronic kidney disease. Current treatments for this disease are somewhat effective, but often lead to adverse side effects.

The formation of L-cystine stones is a consequence of excessive levels of L-cystine in the urine. L-cystine forms into crystals, which aggregate into stones, reaching up to a centimeter in diameter.

Current treatments for L-cystine stone prevention, such as dilution through high fluid intake, can suppress, but may not completely prevent, stone formation. Some medications can react with L-cystine to generate more soluble compounds, but these drugs can cause adverse side effects such as nausea, fever, fatigue, skin allergies, and hypersensitivity.

With the limitations of current treatments in mind, the researchers sought to curb the formation and growth of L-cystine crystals.

Using atomic force microscopy (AFM), which allows for the observation of objects as small as a nanometer, the researchers found that L-cystine crystals grow through the continual attachment of L-cystine molecules to the edges of hexagon-shaped hillocks on the crystal surface. This process results in spiral growth patterns.

Knowing how these crystals grew, the researchers could then select a chemical agent to inhibit this process. Crystal growth can be altered through the use of tailored growth inhibitors. These inhibitors reduce crystallization rates by binding to crystal surfaces in ways that prevent the addition of crystal molecules to the surface, which is necessary for their normal formation.

In the Science study, the researchers used a synthetic agent, L-CDME, which is structurally identical to L-cystine in its center, but is equipped with different molecular "blocking" groups at the ends designed to prevent the attachment of L-cystine molecules to the crystal surface.

Using AFM to observe crystal growth and the effect of this designer inhibitor, the NYU investigators found that L-CDME blocked the growth of the L-cystine crystals by binding to L-cystine molecules protruding from the edges of the hexagon-shaped hillocks. Consequently, the blocking groups obstructed the approach of additional L-cystine molecules to those edges. The researchers found similar success with the introduction of another synthetic agent, L-CME. Their results were confirmed by parallel measurements of crystal yields under the same conditions.

"This may lead to a new approach to preventing cystine stones simply by stopping crystallization," explained Michael Ward, the study's corresponding author and chair of NYU's Department of Chemistry. "Moreover, these findings are an example of the significant advances that can be achieved through collaborations between researchers in physical sciences and in medicine."

The study's other co-authors include: Jeffrey D. Rimer, a former postdoctoral fellow at NYU's Department of Chemistry and now an assistant professor at the University of Houston; Zhihua An, a postdoctoral fellow at NYU's Department of Chemistry; Zina Zhu, a doctoral student at NYU's Department of Chemistry; Michael Lee, a former NYU chemistry undergraduate now enrolled in the NYU Medical School; David Goldfarb, a professor at NYU School of Medicine; and Jeffrey A. Wesson, an associate professor at the Medical College of Wisconsin.

Overseas nurses feel their skills are underused and they aren't valued or respected

Many overseas nurses have negative experiences of living and working in the UK, particularly when it comes to feeling personally valued and professionally respected, according to the October issue of the Journal of Clinical Nursing.

Researchers from the University of Northampton also found that discrimination and racism still exist in the National Health Service and that the reality of first-world UK nursing is often very different to what overseas nurses expect.

Senior lecturer and nurse Julia Nichols and Professor of Neurophysiology Jackie Campbell carried out an in-depth research review of 30 papers, surveys and Government strategy documents published since 1997, covering the views of nearly 4,000 overseas nurses.

"If overseas nurses chose to leave the UK in large numbers, health services could face a severe staffing shortage" says Julia Nichols. "It is important that we listen carefully to their experiences to help identify priorities for policies and practice so that we can improve migrant nurses' job satisfaction and articulate the value that they bring to UK nursing."Although some positive experiences are described, significant numbers of nurses describe not feeling personally or professionally valued by the UK nursing establishment and common emotions include disappointment and unmet expectations."

The UK has a long established tradition of employing overseas nurses, particularly from the Republic of Ireland and the Commonwealth. This dates back to the Colonial Nursing Service, which was established in the 1940s to unify the administration of nursing appointments across Britain and its overseas dependencies.

Since 1997 approximately 100,000 international nurses from 50 countries have obtained UK registration, with the largest numbers coming from the Philippines, India, South Africa and Australia. However, the Nursing and Midwifery Council reports that almost a fifth of the nurses who joined the register between 1997 and 2006 did not renew their registration.

The research review carried out by Nichols and Campbell provides a number of clues about why retention is an ongoing issue, including:

* Highly skilled and proficient nurses being used in junior positions where their expertise and experience went unrecognised. Some nurses even felt the need to hide their skills to avoid alienating the less experienced staff they reported to.

* Racism and discrimination. One study even went as far as to suggest that the NHS was institutionally racist, with overseas nurses being socially excluded and having their career progression blocked.

* Particular problems working in elderly care homes, where nurses felt their nursing skills were replaced by unfamiliar and basic personal care, such as feeding, washing and toileting. They also reported poor working relationships, a lack of respect and feeling humiliating and degraded by the attitudes of some colleagues.

* Disappointment when they discovered that their expectation of working in advanced first-world health care – with high-tech equipment, clean hospitals, high standards of care, good staff-patient ratios and positive working conditions – were not realised. And frustration that following policies and protocols made nurses risk adverse.

The review has prompted the authors to make a number of suggestions as to how retention could be improved. These include:

* Managing nurses' expectations more effectively by not over-selling UK nursing in a way that can only lead to disappointment.

* Not recruiting the most senior staff for junior positions, as this will lead to professional frustration.

* Valuing the skills and expertise that overseas nurses bring to the UK through appropriate and timely professional development.

* Learning from other healthcare systems, and being open to new ideas, rather than trying to impose the 'our way is the only way' style of nursing.

* Making it clear that racism and prejudice have no place in UK healthcare and will not be tolerated, in any form, by organisations that respond swiftly and effectively to any problems.

* Providing equality and diversity training with staff required to demonstrate their awareness of issues and commitment to good practice.

* Monitoring equal opportunities through transparent processes to ensure fair treatment and career progression.

* Providing qualified and enthusiastic mentors who can enhance the early experiences and orientation of newly arrived overseas nurses.

"The key themes that emerged from our research review suggest that, while there are many positive accounts of working in the UK, many overseas nurses find it a negative, frustrating experience" concludes Julia Nichols.

"Managing nurses' expectations and respecting their expertise are vital if we are to make best use of their skills and knowledge. We need to put caring back into the heart of nursing and this extends to supporting and nurturing overseas nurses."

Notes to editors *The experiences of internationally recruited nurses in the UK (1995-2007): an integrative review. Nichols J and Campbell J. Journal of Clinical Nursing.19, 2814-2823. (October 2010). DOI: 10.1111/j.1365-2702.2009.03119.x*

Scientists suggest that cancer is purely man-made

(PhysOrg.com) -- Cancer is a modern, man-made disease caused by environmental factors such as pollution and diet, a study by University of Manchester scientists has strongly suggested.

The study of remains and literature from ancient Egypt and Greece and earlier periods – carried out at Manchester's KNH Centre for Biomedical Egyptology and published in Nature Reviews Cancer – includes the first histological diagnosis of cancer in an Egyptian mummy.

Finding only one case of the disease in the investigation of hundreds of Egyptian mummies, with few references to cancer in literary evidence, proves that cancer was extremely rare in antiquity. The disease rate has risen massively since the Industrial Revolution, in particular childhood cancer – proving that the rise is not simply due to people living longer.

Professor Rosalie David, at the Faculty of Life Sciences, said: "In industrialised societies, cancer is second only to cardiovascular disease as a cause of death. But in ancient times, it was extremely rare. There is nothing in the natural environment that can cause cancer. So it has to be a man-made disease, down to pollution and changes to our diet and lifestyle."

She added: "The important thing about our study is that it gives a historical perspective to this disease. We can make very clear statements on the cancer rates in societies because we have a full overview. We have looked at millennia, not one hundred years, and have masses of data."

The data includes the first ever histological diagnosis of cancer in an Egyptian mummy by Professor Michael Zimmerman, a visiting Professor at the KNH Centre, who is based at the Villanova University in the

US. He diagnosed rectal cancer in an unnamed mummy, an 'ordinary' person who had lived in the Dakhleh Oasis during the Ptolemaic period (200-400 CE).

Professor Zimmerman said: "In an ancient society lacking surgical intervention, evidence of cancer should remain in all cases. The virtual absence of malignancies in mummies must be interpreted as indicating their rarity in antiquity, indicating that cancer causing factors are limited to societies affected by modern industrialization".

The team studied both mummified remains and literary evidence for ancient Egypt but only literary evidence for ancient Greece as there are no remains for this period, as well as medical studies of human and animal remains from earlier periods, going back to the age of the dinosaurs.

Evidence of cancer in animal fossils, non-human primates and early humans is scarce – a few dozen, mostly disputed, examples in animal fossils, although a metastatic cancer of unknown primary origin has been reported in an Edmontosaurus fossil while another study lists a number of possible neoplasms in fossil remains. Various malignancies have been reported in non-human primates but do not include many of the cancers most commonly identified in modern adult humans.

It has been suggested that the short life span of individuals in antiquity precluded the development of cancer. Although this statistical construct is true, individuals in ancient Egypt and Greece did live long enough to develop such diseases as atherosclerosis, Paget's disease of bone, and osteoporosis, and, in modern populations, bone tumours primarily affect the young.

Another explanation for the lack of tumours in ancient remains is that tumours might not be well preserved. Dr. Zimmerman has performed experimental studies indicating that mummification preserves the features of malignancy and that tumours should actually be better preserved than normal tissues. In spite of this finding, hundreds of mummies from all areas of the world have been examined and there are still only two publications showing microscopic confirmation of cancer. Radiological surveys of mummies from the Cairo Museum and museums in Europe have also failed to reveal evidence of cancer.

As the team moved through the ages, it was not until the 17th century that they found descriptions of operations for breast and other cancers and the first reports in scientific literature of distinctive tumours have only occurred in the past 200 years, such as scrotal cancer in chimney sweeps in 1775, nasal cancer in snuff users in 1761 and Hodgkin's disease in 1832.

Professor David – who was invited to present her paper to UK Cancer Czar Professor Mike Richards and other oncologists at this year's UK Association of Cancer Registries and National Cancer Intelligence Network conference – said: "Where there are cases of cancer in ancient Egyptian remains, we are not sure what caused them. They did heat their homes with fires, which gave off smoke, and temples burned incense, but sometimes illnesses are just thrown up."

She added: "The ancient Egyptian data offers both physical and literary evidence, giving a unique opportunity to look at the diseases they had and the treatments they tried. They were the fathers of pharmacology so some treatments did work

"They were very inventive and some treatments thought of as magical were genuine therapeutic remedies. For example, celery was used to treat rheumatism back then and is being investigated today. Their surgery and the binding of fractures were excellent because they knew their anatomy: there was no taboo on working with human bodies because of mummification. They were very hands on and it gave them a different mindset to working with bodies than the Greeks, who had to come to Alexandria to study medicine."

She concluded: "Yet again extensive ancient Egyptian data, along with other data from across the millennia, has given modern society a clear message – cancer is man-made and something that we can and should address."

More information: *A copy of the paper 'Cancer: an old disease, a new disease or something in between?' is available at http://www.nature. ... nrc2914.html Provided by University of Manchester*

Bilingualism Good for the Brain

The longer a person has spoken two or more languages, the greater the cognitive effects.

By Jessica Marshall | Thu Oct 14, 2010 02:30 PM ET

Bilingual education is controversial in the United States, but a growing body of research shows that regularly speaking two languages comes with certain types of improved mental performance. In a Perspective article appearing today in the journal Science, Jared Diamond of the University of California, Los Angeles, and author of "Guns, Germs and Steel" highlights studies of bilingualism that show this effect.

Diamond began wondering about the effects on the brain of multilingualism while camping with New Guinea Highlanders, all of whom could speak between five and 15 languages.

"What are the cognitive effects of such multilingualism?" Diamond asked in the new article.

"Being able to use two languages and never knowing which one you're going to use right now rewires your brain," said Ellen Bialystok of York University in Toronto, Canada, whose work Diamond cited repeatedly in the article. "The attentional executive system which is crucial for all higher thought -- it's the most important cognitive piece in how we think -- that system seems to be enhanced," she noted.

Executive functioning allows us to keep a goal in mind, take actions to achieve that goal, and to ignore other information that might distract us from that goal, said Albert Costa, who studies bilingualism at the Universitat Pompeu Fabra in Barcelona, Spain.

"The question is: Would it be the case that bilinguals, by the constant need for controlling the two languages, develop a more efficient executive functioning system?" he said. "The results suggest that bilinguals may have this positive collateral effect." "The effects are much stronger when you go to kids and older people," he added. These are ages where executive functioning is worse.

Bialystock has shown that bilinguals do better at tests that require multitasking, including ones that simulated driving and talking on a phone. "Make no mistake: Everybody is worse," Bialystock said, "but the bilinguals were less worse."

Bialystock's studies focused on people who were truly bilingual. The longer people have spoken multiple languages, the greater the cognitive effects. There are even benefits when languages were taken up at later ages. "We have not seen a cutoff," she said.

Bilingualism comes with some cost, Bialystock and Costa agreed.

"For bilinguals, there are a couple of milliseconds before you can target the right word in the right language. Bilinguals have more 'tip-of-the-tongue' problems," Bialystock said.

"Bilingual children have on average a smaller vocabulary in each of their languages than monolingual children," she added. "There is a smaller vocabulary in each language, but they probably know more words altogether."

But having improved executive functioning, Bialystock argues, is more important than small differences in vocabulary or millisecond lags in word retrieval.

Still, all of these findings are somewhat abstract. It is difficult to take laboratory findings showing better executive functioning in bilinguals and demonstrate that they translate into better performance in the workplace or some other practical environment.

In one real-world application, Bialystock's recent work shows that multilingualism can provide health benefits to Alzheimer's patients.

"We have demonstrated in at least two separate studies of several hundred people altogether that -- all else being equal -- people who have spent their lives speaking two languages are better able to cope with the pathology of Alzheimer's," she said. "They show symptoms of the disease up to four years later than monolinguals. Once the disease starts to destroy areas of the brain, bilinguals are able to keep functioning." "It's the same argument that you hear for doing crossword puzzles and such," she explained, though she argues that language provides a more intense and varying type of mental exercise, which is why the effect is so strong.

In total, the evidence suggests attitudes bilingualism should be better accommodated in monolingual societies, Bialystock said. "When people come from somewhere and join you in your country, don't make them give up their language."

While Costa said that the findings on Alzheimer's patients should be taken cautiously, he agreed that there are social benefits to be had from better accommodation of bilingualism in an increasingly international world.

"For a while it has worked to be monolingual," he said. "I don't think it's tenable anymore."

First TB vaccine booster unveiled by Seattle scientists

Seattle scientists have developed a tuberculosis vaccine that may boost the effectiveness of the only existing vaccine, extending immunity against the disease. So far, the new vaccine has been tested only in laboratory animals. But if results are similar in people, it could prove a powerful tool to reduce the toll of a disease that kills nearly 2 million people a year -- most of them in poor countries.

"The thing that got me excited is that this is the first example I know of where a boost strategy really made a substantial difference in outcome," said David Sherman, a tuberculosis expert at Seattle BioMed who was not involved in the project. The new vaccine was developed at the Infectious Disease Research Institute, a nonprofit bioscience laboratory. The research was funded by grants from the National Institutes of Health.
Researchers hope to begin human trials early next year, said Steven Reed, IDRI founder and research director. If the vaccine's effectiveness is borne out, he estimates it would be five to 10 years before it reaches the market.

The existing tuberculosis vaccine, called BCG (bacillus Calmette-Guerin), isn't well known in the United States. But 120 million infants a year get the shot in Africa and much of the developing world. It provides partial protection against a virulent form of the disease, but the immunity wears off around the age of 10.

Scientists have been searching decades for a way to boost the vaccine.

The IDRI vaccine was able to confer lifelong immunity to guinea pigs that had received a BCG shot, Reed said.

"The real hope we have now is that we know immunity to tuberculosis can be enhanced over that provided by BCG, and it can be enhanced with an approach that is highly scalable, inexpensive and safe."

The IDRI vaccine contains four key proteins from the bacterium that causes tuberculosis.

In mice, the vaccine protected against several strains of TB -- including a strain that is resistant to drugs used to treat the disease. The vaccine also induced an immune response in monkeys and pigs.

Even if it proves equally effective in humans, the new vaccine is unlikely to replace BCG as a stand-alone shot, Sherman said. "Something would have to be dramatically better before the public health infrastructure all over the world changes what it does."

But as a booster shot, the new vaccine might be able to protect people well into adulthood.

Tuberculosis can be treated, but the regimen includes multiple drugs and takes six months. Drug-resistant strains of the disease are becoming more common, including some that defy every weapon in the modern arsenal. With nearly a third of the world's population harboring latent or active tuberculosis infections, the disease can also spread rapidly as people travel.

"If we think about making a dramatic reduction in tuberculosis death and transmission, a vaccine will be a very important component," Reed said.

As a nonprofit, IDRI's goal would be to license the vaccine to a manufacturer, probably in India, that would produce it at low cost and get it into the hands of those who need it.

Study confirms: Whatever doesn't kill us can make us stronger

Psychologists say we fare better after some life difficulties, than if we've had many or none at all

BUFFALO, N.Y. -- We've all heard the adage that whatever doesn't kill us makes us stronger, but until now the preponderance of scientific evidence has offered little support for it.

However, a new national multi-year longitudinal study of the effects of adverse life events on mental health has found that adverse experiences do, in fact, appear to foster subsequent adaptability and resilience, with resulting advantages for mental health and well being.

The study, "Whatever Does Not Kill Us: Cumulative Lifetime Adversity, Vulnerability and Resilience," to be published in the forthcoming issue of the Journal of Personality and Social Psychology, is available on the website of the American Psychological Association at http://psycnet.apa.org/psycinfo/2010-21218-001/.

It examined a national sample of people who reported their lifetime history of adverse experiences and several measures of current mental health and well being.

Authors are Mark Seery, PhD, assistant professor of psychology at the University at Buffalo; E. Alison Holman, PhD, assistant professor of nursing sciences, University of California, Irvine; and Roxane Cohen Silver, PhD, professor of psychology and social behavior and medicine at UC Irvine.

Seery, senior author of the study, says previous research indicates that exposure to adverse life events typically predicts negative effects on mental health and well-being, such that more adversity predicts worse outcomes.

But in this study of a national survey panel of 2,398 subjects assessed repeatedly from 2001 to 2004, Seery and co-researchers found those exposed to some adverse events reported better mental health and well-being outcomes than people with a high history of adversity or those with no history of adversity.

"We tested for quadratic relationships between lifetime adversity and a variety of longitudinal measures of mental health and well-being, including global distress, functional impairment, post-traumatic stress symptoms and life satisfaction," Seery says.

"Consistent with prior research on the impact of adversity, linear effects emerged in our results, such that more lifetime adversity was associated with higher global distress, functional impairment and PTS symptoms, as well as lower life satisfaction.

"However," says Seery, "our results also yielded quadratic, U-shaped patterns, demonstrating a critical qualification to the seemingly simple relationship between lifetime adversity and outcomes.

"Our findings revealed," he says, "that a history of some lifetime adversity -- relative to both no adversity or high adversity -- predicted lower global distress, lower functional impairment, lower PTS symptoms and higher life satisfaction."

The team also found that, across these same longitudinal outcome measures, people with a history of some lifetime adversity appeared less negatively affected by recent adverse events than other individuals.

Although these data cannot establish causation, Seery says the evidence is consistent with the proposition that in moderation, experiencing lifetime adversity can contribute to the development of resilience.

"Although we studied major lifetime adversity," he says, "there is reason to believe that other relatively mundane experiences should also contribute to resilience.

"This suggests that carefully designed psychotherapeutic interventions may be able to do so, as well, although there is much work that still needs to be done to fully understand resilience and where it comes from."

Wind turbines 'lure in' animals

By Matt Walker Editor, Earth News

A study has revealed that a wind turbine's colour affects how many insects it attracts, shedding more light on why the turbines occasionally kill bats and birds.

Scientists say that turbines, most commonly painted white or grey, draw in insects. These then lure bats and birds - as they pursue their prey - into the path of the turbine blades. Support for the idea comes from another study showing that bats are most often killed by turbines at night and in summer, when insects are most abundant.

Paint them purple?

"It had been speculated that insects may be attracted to turbine structures for some reason and this then could attract insectivorous species, such as birds and bats, to forage in the vicinity," said PhD student Chloe Long of Loughborough University, UK. However, she added, "no other study has looked in detail at what specific insect species might be attracted to turbine installations or why".

So Miss Long and her Loughborough colleagues, Dr James Flint and Dr Paul Lepper, conducted the first empirical study of insect attraction to wind turbines, the results of which are published in the European Journal of Wildlife Research. In particular, they measured how a turbine's colour alters how many insects gather around it. Most turbines are painted pure white or light grey, in a bid to make them as visually unobtrusive as possible.

But insects, it seems, are unlikely to ignore these muted tones.

The researchers measured how many insects were attracted to a range of paint colours, including pure white, light and dark grey, sky blue, red and purple.

They did so by laying out coloured cards in a random sequence next to a 13m-high three-blade wind turbine situated in a meadow near Leicestershire, UK. The scientists were surprised by what they discovered.

"Our major conclusion from this work is that turbine paint colour could be having a significant impact on the attraction of insect species to the structure, both during the day and at night," Miss Long told the BBC.
What is more, turbines painted pure white and light grey drew the most insects bar just one other colour; yellow.

The insects attracted included small flies (body size less than 5mm); large flies (body size equal to or greater than 5mm); greenfly; moths and butterflies; thrips; beetles and crane flies.

"We found it extremely interesting that the common turbine paint colours were so attractive to insects," said Miss Long. "Our findings support the hypothesis that turbines may be attractive to insects." The least attractive paint colour to insects was purple.

That does not necessarily mean that all wind turbines should be painted that colour, say the researchers.

But it does imply that changing a turbine's colour could have a profound impact on the number of insects it lures in and therefore the number of birds and bats that follow.

The researchers also found that the ultraviolet and infrared components of paint colour, which humans cannot see but insects can, also had a significant impact, with higher levels of both attracting more insects.

"If the solution were as simple as painting turbine structures in a different colour this could provide a cost-effective mitigation strategy," says Miss Long.

But she and her colleagues suspect that other factors play a role in attracting birds and bats to wind turbines. As well as the turbines' colour, the heat they generate may attract insects and their predators.

Bats may also find turbines difficult to detect using echolocation.

BAT STRIKES

Bats are more likely to be killed by wind turbines at night and during the summer, researchers have discovered.
The reason is thought to be because the turbines attract migrating insects.
At some sites, 20 to 40 bats are killed each year per turbine, although rates of one to three bats are more typical.
Now scientists have ascertained that 90% of bat mortality occurs in northern Europe between late July and early October. A similar pattern occurs in North America.
Observations from both continents also show that most bats are killed on relatively warm nights with low wind speed.
While the review by scientists does not provide all the answers, it suggests wind turbines are tall enough to attract insects migrating at night, which typically fly at heights of over 60m.
Bats and birds are then killed by turbine blades as they feed on this insect bonanza.

Giant Pterosaurs Could Fly 10,000 Miles Nonstop

Reptiles burned fat stores equal to a "good-size human" each trip, expert says.

Ker Than for National Geographic News

Large pterosaurs may have been the frequent-flier champions of the dinosaur age, capable of soaring up to 10,000 miles (16,000 kilometers) at a stretch, scientists say (explore a prehistoric time line).

Currently paleontologists know of four species of giant pterosaur, some of which were as tall as giraffes and had wingspans of more than 30 feet (10 meters).

The huge animals likely relied on updrafts of warm air and wind currents to achieve their record distances, said study co-author Michael Habib, a paleontologist at Chatham University in Pittsburgh.

"They probably only flapped for a few minutes at a time ... and then their muscles had to recover," he said. "In between, they're going to use unpowered flight" and glide.

A radio-controlled model of Quetzalcoatlus northropi, digitally superimposed over a picture of the sun. Image by William James Warren, Science Faction/Corbis Images

Even so, the winged reptiles would have needed to burn about 160 pounds (72 kilograms) worth of fat reserves per trip, Habib said. "They're basically burning off the equivalent of a good-size human on each trip."

Bulky Pterosaurs Launched From All Fours

The new flight distance estimate for pterosaurs is based on the latest models of the ancient animals' wingspans, wing shapes, body masses, and fat capacities.

"The tricky part was deciding how much fuel they can carry," Habib said. For example, "migrating birds lose about 50 percent of their body weight during long migrations."

But the needs of pterosaurs may have been different, because their anatomy suggests they flew differently than modern-day birds. For instance, scientists had previously used the largest living bird, the wandering albatross, to model pterosaur flight. But "we don't expect [pterosaurs] to have the same flapping frequency as an albatross, nor do we expect that they soared the same way as an albatross," Habib said.

The 10,000-mile flight estimate may even be a little conservative, said Habib, who presented his work this week at the annual Society for Vertebrate Paleontology meeting in Pittsburgh.

"The lowest range estimates were about 5,000 miles (8,000 kilometers), while the highest were around 20,000 miles (32,000 kilometers)," he said. "In the middle range, where all the numbers lined up and I had high confidence, you get about 10,000 miles."

The findings would seem to contradict past studies that suggested large pterosaurs had problems just getting off the ground due to their massive sizes.

For example, Quetzalcoatlus northropi, a giant pterosaur that lived in what is now Texas 70 million years ago, is thought to be the largest flying creature that ever lived, weighing more than 400 pounds (200 kilograms).

Some scientists speculate this hefty species couldn't take off from the ground as birds do, but had to drop from trees or cliffs to take to the skies. Instead, Habib and colleagues think that—like some modern bats—large pterosaurs may have used all four limbs to launch themselves into the air before flapping their wings.

"I'm pretty confident that pterosaurs didn't take off anything like a bird," Habib said.

Giant Pterosaurs Were Global "Superspecies"?

Overall, the new research "makes all of us think more about how [pterosaurs] might have functioned," said Alexander Kellner, a pterosaur expert at Brazil's National Museum in Rio de Janeiro. But Kellner has some doubts about the results.

That's because there are several things scientists still don't know about pterosaur body structure that could affect flight distance calculations, he said. One particularly well-preserved Chinese pterosaur fossil, for example, has wing membranes made up of multiple layers of structural fibers unlike anything found in a living animal.

"We are not sure what the composition of those [fibers] is, but we can say that they have a tremendous influence in the flight of those creatures," Kellner said in an email.

If Habib's calculations are correct, the results raise the possibility that large pterosaurs could crisscross entire continents or even fly between continents on a fairly regular basis. Unlike most species, which tend to be native to specific geographic regions, the dino-era fliers may have been well-traveled "superspecies" that called the entire globe their home.

"If [giant pterosaurs] could fly very far, that might change how scientists think about their distribution," Habib said.