

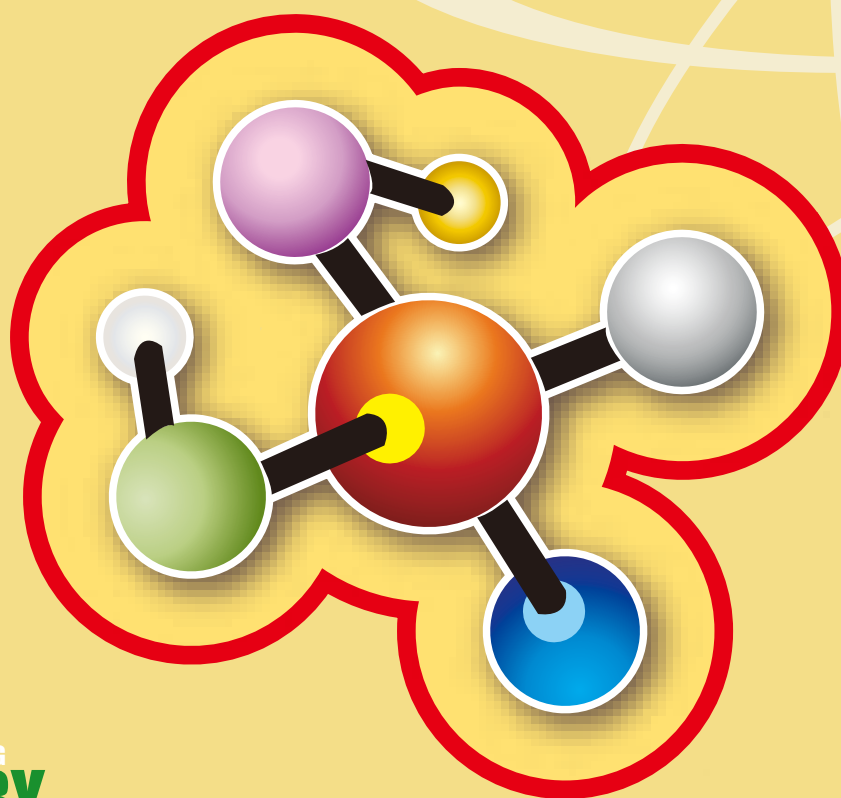


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February 1, 2008

Sperm Subject To Attack--By Pollution

Mice kept in cages near highways and steel mills suffered high rates of mutations in their sperm--in pieces of DNA related to gene expression and disease. Cynthia Graber reports.

Air pollution is bad for our health, but scientists say we don't know much about the long-term effects. So researchers in Canada and the Netherlands decided to gather genetic information in an urban industrial environment—by looking at mouse sperm. They published the study in the Proceedings of the National Academy of Sciences.

The scientists placed cages of mature male mice near two steel mills and a major highway in the city of Hamilton, in Ontario, Canada. Some of the mice breathed in the ambient, particulate-filled air. The control mice breathed pure, filtered air. After ten weeks, researchers checked the two groups. The mice exposed to the polluted air had a 60 percent higher rate of sperm mutation. It occurred in a piece of DNA particularly susceptible to mutation.

Researchers say these specific mutations are known to affect gene expression and genome stability, and could lead to changes in genetic composition and disease. They say they can't yet extrapolate from these findings to the long-term health effects in humans, but they say the results definitely warrant a more detailed look at pollution's effects on our genes.

—*Cynthia Graber*



February 4, 2008

Salad Dressing Science Mixes Up Researchers

Researchers studying oil-water mixtures in the hopes of learning how to keep salad dressing mixed found that water droplets merge as they're being pulled apart, not as they're being pushed together. Chelsea Wald reports.

Vinaigrette dressing. When you shake it, little vinegar droplets scatter through the oil. But when you put it down, the droplets merge and the dressing separates. That's probably not a big inconvenience to you, but it is to industries that use lots of vinaigrette-like mixtures. So to study this un-mixing, French researchers planned to float water droplets one at a time through a channel of flowing oil. The channel widened in the middle, so the oil would slow down and bump the water droplets together. Then the passage narrowed again, so the oil would speed up and pull the droplets apart.

The researchers expected that the droplets would merge when they bumped together. But that's not what happened. In fact, it was when the droplets started to pull apart from each other that they suddenly mixed. In *Physical Review Letters*, the researchers say that the pulling apart may make the pressure between the droplets fall. That would make the droplets burst open, and then they could merge into one big water droplet. What the researchers don't say is whether this finding could lead to a true breakthrough: stay-mixed salad dressing.

—*Chelsea Wald*



February 5, 2008

Parasitized Ants Get Berry Sick

A nematode parasite causes ants to look like berries that birds like, putting ants on the diet and helping to spread the parasite. Cynthia Graber reports.

When is an ant like a piece of fruit? When it's infected by a parasite. Researchers affiliated with the Smithsonian Tropical Research Institute discovered this bizarre occurrence in Central America as they were studying the gliding ability of a certain species of ant. They found some colony members with bright red swollen abdomens. The scientists took specimens back to the lab and discovered they were full of hundreds of nematode eggs. The bright red bellies look suspiciously like the brilliant red and pink berries that proliferate in the rainforest.

Researchers think that the nematode makes the ant look like fruit to get birds to eat the ants. Birds usually keep the ants off their menu because of armor and a bad chemical taste. The birds then spread parasite eggs in their droppings. Ants forage through bird droppings for seeds. They feed the infected droppings to ant larvae, beginning the infection process all over again. The red-bellied ant is the first known case of a parasite causing fruit mimicry. One of the researchers was surprised that something "dumb as a nematode" can manipulate its host in such a sophisticated way. But evolution works no matter how dumb organisms are.

--Cynthia Graber



February 6, 2008

Scratching Brings Mental Satisfaction

Brain scans show that scratching does indeed work to decrease unpleasantness. And although it can be pleasurable, scratching doesn't appear to stimulate pleasure centers. Karen Hopkin reports.

When you have an itch, nothing feels better than a good scratch. Now scientists from Wake Forest University Baptist Medical Center think they know why. The scientists were wondering why raking fingernails across skin brings us such pleasure. So they looked to the brain. More precisely, they looked in the brain. Using advanced imaging techniques, the scientists looked to see which parts of the brain are most active when people scratch. Or, in this case, when people are scratched by a guy in a white lab coat with a special scratching brush.

What they found is: scratching does not activate areas of the brain normally associated with pleasure. Although it did boost the activity of the prefrontal cortex, which can be involved in compulsive behavior—that makes sense. But the major effect of scratching was to decrease the activity of brain regions associated with unpleasant sensory experiences. So scratching seems to relieve the unpleasant feelings that accompany, well, itching. Yes, in a landmark study that appears in the *Journal of Investigative Dermatology*: scratching gets rid of the itch. Me, I'm holding out for the study that shows that people bang their heads against the wall because it feels so good when you stop.

—Karen Hopkin



February 7, 2008

Life's U-Shaped Path of Happiness

A cross-cultural study including 74 countries finds that most people do indeed have a midlife crisis--but most also find ways to get happy again. Adam Hinterthuer reports.

Hitting your mid forties? Chances are you're feeling down. But don't hang your head, you're just at the bottom of life's 'U' shaped path of happiness. You might not see it from here, but things are looking up. A study in the journal *Social Science and Medicine* says mid-life malaise is part of being human. Offering proof that misery loves company, researchers found that millions of people from 74 different countries followed similar life paths. They moved from youthful happiness toward mid-life depressions, then back to happiness in their golden years. Earlier studies suggested psychological wellbeing was consistent throughout life. But this report says, from Azerbaijan to Zimbabwe, there's no getting around that mid-life crisis.

Regardless of cultural differences, financial success or marital status, a period of depression settles over our forties. But our late fifties, we cheer back up. Researchers speculate that, as we get older, unrealistic expectations are tempered by reality. In other words, we learn to expect less from life. But, they say, a happier possibility is that we just get better at counting our blessings.

—Adam Hinterthuer



February 8, 2008

Harnessing Power Wasted While Walking

A device that attaches to your knees could harvest the five watts you produce while walking. Karen Hopkin reports.

Last month, the journal *Science* reported that a Swedish company was planning on using the body heat generated by commuters in a Stockholm train station to warm a nearby office building. If that sounds too...personal, they're not the only ones thinking about ways to reuse wasted energy. A team of scientists from Ann Arbor, Pittsburgh and British Columbia have come up with a way to tap pedestrian power. They've created a device, which straps onto your knees, that can harvest energy from your stride the same way hybrid electric vehicles recycle power during braking.

Their report, which appears in the February 8 issue of *Science*, shows that walkers can generate about five watts of power without so much as breaking a sweat. That's enough energy to run 10 cell phones or two computers at once, which could be good news for people who live in countries where access to electricity is spotty. The bad news is: the device could enable commuters to talk on the phone, listen to music, email their friends, play video games, check their stock quotes, and photograph themselves doing it, just by pacing back and forth waiting for their morning latte. We beseech them not to—on bended knee.

—Karen Hopkin



February 11, 2008

Not So Fast On Biofuels

Two studies in the latest issue of the journal *Science* say that producing biofuels may actually produce more carbon dioxide than we would with conventional fuel. Karen Hopkin reports.

For years advocates have touted the use of biofuels as a clean-burning alternative to gasoline. Now a pair of studies published in the February 8 issue of *Science* conclude that biofuels may do more harm to the environment than good. The researchers calculated the indirect costs of growing the crops that are turned into biofuels. To plant the corn or sugarcane or soybeans from which biodiesel and bioethanol are made, farmers would first need to clear forests and grasslands. That process, it turns out, would actually generate more carbon dioxide than we'd save by swearing off fossil fuels. And it would take centuries for us to pay off that carbon debt.

For example, the scientists figure it would take 319 years of using ethanol made from soybeans to make up for the extra carbon released by chopping down the forests needed to grow the crop. And of course more CO₂ in the atmosphere means more global warming. So biofuels might actually exacerbate the problem they're meant to solve. Something to think about as we move forward on producing ecofriendly fuels. As one of the scientists put it, we should make sure our cure isn't worse than the disease.

—Karen Hopkin



February 12, 2008

Coffee Tasting Machine Stirs Industry

Quality-control coffee tasters take note: a machine may make you obsolete. Adam Hinterthuer reports.

These days, it seems no one's job is safe from computerized replacements. Now it's time to add coffee experts to that list. Scientists at the Nestle Research Center in Switzerland have developed a coffee-tasting machine that can sip and evaluate a brew almost as well as professional human tasters. The machine takes a sample of the gases produced by a steaming shot of espresso and analyzes dozens of ions associated with taste and aroma. Those ions are assigned to categories in a "sensory evaluation dataset." But, that doesn't mean the results are dry chemical formulas. In fact, the machine has a vocabulary that would make any sommelier jealous. After it crunches the numbers, it spits out words like "flowery," "woody," and "butter toffee" to describe its drinking experience.

Researchers say machines like this could be efficient monitors of quality control in the food industry. And no matter how many cups a day it samples, the mechanized coffee taster will never get jittery. Nevertheless, rumor has it that the machine has already demanded a daily 15-minute anything-but-coffee break.

—Adam Hinterthuer



February 13, 2008

Plants Don't Like Greenhouse Effect

Fossil remains indicate that insects actually eat more plant material when the planet is warmer. Karen Hopkin reports.

Seems like every week brings news that global warming is going to be bad for some poor animal or other. But plants? Well, I guess I was thinking that plants would welcome the heat. I mean, global warming is caused by greenhouse gases. And plants live in greenhouses. So everyone's happy. Well, according to a new study, published in the February 12 issue of the *Proceedings of the National Academy of Sciences*, I was wrong. Or at least not quite right. Because plants, too, are likely to face problems as the earth heats up. And their biggest problem is likely to be: insects.

Scientists were looking at the fossilized remains of leaves that fell off trees about 55 million years ago. At that time, the planet was undergoing a period of warming. The scientists found that as the temperatures rose, the leaves looked more...nibbled. Seems that with more CO₂ in the atmosphere, plants take up more carbon. That actually makes their leaves less nutritious for plant-munching bugs—so the insects just eat more. So, a warmer planet will be home to some hungry bugs. Which I daresay will not please the trees. Or anyone else who relies on plants for food—which includes, ultimately, all of us.

—Karen Hopkin



February 14, 2008

Barnacles Reach Out To Valentines

Barnacles are stuck to rocks, which presents a challenge for mating. But evolution has endowed them with unique abilities. Cynthia Graber reports.

It's Valentine's Day. Even for barnacles. Which are stuck to rocks. But evolution has endowed these stationary creatures with some curious abilities, according to research published on-line in the Proceedings of the Royal Society. Male barnacles have members that can stretch to eight times their body length to reach a similarly stuck female. They have other problems, though—strong waves and tides.

Scientists at Canada's University of Alberta discovered that barnacles cope with this challenge by developing differently shaped genitalia. Barnacles that cling to rocks on wave-exposed shores have shorter, wider organs, so they can maintain control in violent waters. Those that live in coves protected from crashing waves have longer, slimmer ones. Researchers transplanted young barnacles living in protected coves to unprotected ones, and vice versa. And the animals developed accordingly. For example, barnacles from calm areas that were moved to turbulent seas grew short, wide members. This experiment shows that barnacles can develop their digit to suit local conditions, and reach through churning waters to connect with someone special.

—Cynthia Graber



February 15, 2008

A Bill of Rights for Scientists

The Union of Concerned Scientists wants Congress to pass a Scientists' Bill of Rights to protect federal researchers from political pressure and intrusion. Steve Mirsky reports. For more information, go to www.ucsusa.org/scientificfreedom

On February 14th, the Union of Concerned Scientists issued a call for the protection of federal scientists. The UCS press conference took place in space made available by the American Association for the Advancement of Science, whose annual meeting is taking place in Boston. Francesca Grifo is the director of the UCS's scientific integrity program: "As we transition to the next administration, regardless of who we vote to place at its helm, we must ensure that the falsifying of data; the fabricating of results; the selective editing; the intimidation, censoring and suppression of scientists; the corruption of advisory panels; and the tampering with scientific procedures all stop."

To that end, the UCS wants Congress to pass a scientists' bill of rights. Kurt Gottfriend is professor of physics emeritus at Cornell University and a cofounder of the UCS: "We therefore call on the next president and Congress to codify the basic freedoms that federal scientists must have if they are to produce the scientific knowledge that is needed by a government dedicated to the public good."

—Steve Mirsky, at the AAAS conference in Boston



February 18, 2008

Many Sun-like Stars Can Harbor Earth-like Planets

By measuring the temperature of dust circling nearby Sun-like stars, researchers conclude that rocky bodies are smashing into each other with the potential to aggregate into rocky planets. Steve Mirsky reports from the AAAS conference in Boston.

Earth-like planets have the potential to form around many—and perhaps most—of the nearest stars that are like our sun. Michael Meyer of the University of Arizona announced that discovery Sunday at the annual meeting of the American Association for the Advancement of Science. Meyer says that between 20 and 60 percent of the stars are candidates for the development of rocky planets.

The researchers used the NASA Spitzer Space Telescope. Meyer explains: “With Spitzer, we detect the heat radiation of dust grains, not unlike the smoke you will see rising from chimneys (around here in the Boston area) on a cold day.” Models say that the observed warm dust is consistent with small rocky bodies smashing into each other. “From those observations of dust, we infer the presence of colliding larger rocky bodies, not unlike asteroids and other things in our solar system that we know bang together and generate dust. By tracing that dust, we trace these dynamical processes that we think led to the formation of the terrestrial planets in our solar system.”

—Steve Mirsky, at the AAAS conference in Boston



February 19, 2008

Crichton's Climate Science Fiction

John Holdren, a science and technology policy expert at the JFK School of Government takes novelist Michael Crichton to task for claiming expertise in climate change science, and using it to attempt to influence policy. Steve Mirsky reports from the AAAS conference in Boston.

Some strong comments from John Holdren, director of the science, technology and public policy program at Harvard's JFK School of Government. Saturday at the annual meeting of the American Association for the Advancement of Science, Holdren was talking about media coverage of climate change science: "You know, Michael Crichton, who has become one of the most prominent skeptics in the country, was brought by Senator Inhofe as his chief science witness at a hearing about climate science. I mean, this is a lapsed physician turned science fiction writer, who has the colossal arrogance to say under oath in a hearing when asked by Senator Feinstein, 'Dr. Crichton, do you actually believe that your understanding of this matter is superior to that of the U.S. National Academy of Sciences?' To which he happily answered yes. There's no penalty for that kind of colossal combination of arrogance and ignorance unless you happen to be a scientist. There is a penalty for that sort of thing if you are a scientist. And that puts the scientists at a significant disadvantage in this kind of interaction."

—Steve Mirsky, at the AAAS conference in Boston



Mars Life Predictions Depend on Food Industry

Andrew Knoll, professor of earth and planetary sciences at Harvard, points out the reason we know so much about the conditions that might have or probably wouldn't have supported any microbial life on Mars: food scientists trying to keep our food free of deadly microbes. Steve Mirsky reports from the AAAS conference in Boston.

The Meridiana Planum region of Mars once had water that was really salty and highly acidic, conditions incredibly hostile to any life forms that we know about. So any organisms that might have once lived in that area on Mars would really have had to beat the odds. But why do we know so much about the likelihood of a particular environment to support life? Mars scientists can thank you and me and our propensity to eat.

Harvard professor of earth and planetary sciences Andrew Knoll spoke to reporters Friday at the AAAS meeting: "The food preservation industry depends highly on people knowing the kind of ionic tolerances of microorganisms. So this isn't some esoteric thing that a Mars scientist will pull a paper off a shelf. There are thousands of papers out there on the tolerances of microorganisms. And it's not because most scientists are worried about...it's because they're worried about botulism in canned vegetables." So one science feeds another.

—Steve Mirsky, at the AAAS conference in Boston



February 21, 2008

Blogging Can Make You Number One

If you Google Zbigniew Brzezinski, chances are you'll find the one you're looking for. But finding a particular John Miller or Mary Jones can be problematic. But journalist Clive Thompson says that, because of the ranking system that Google uses, blogging is a good way for the generically named to rise to the top of any searches. Steve Mirsky reports from the Knight Science Journalism Fellowships Future of Science Journalism Symposium in Cambridge, Massachusetts.

“When you google yourself, who do you find?” That question was raised by Clive Thompson, speaking Tuesday at a science journalism symposium in Cambridge, Massachusetts. Thompson is a science and technology writer and columnist at Wired. Back in 2002, if Thompson googled himself, the most popular sites that came up were for a British Lord Clive Thompson. The journalist Clive Thompson wanted his writings to come up first. So he started to blog. “I essentially wanted to hack Google. Google looks for, ya know, if you type in Clive Thompson, it finds every page that has Clive Thompson on it, but then it ranks them based on which pages have the most links pointing to them. Under that logic, the best way to dominate the top spot for you online is to have a site with zillions of things pointing to it. And the sites that tend to have zillions of thing pointing to them are blogs.” Useful info for any John Smiths hoping to be found with a Google search. “After about like two months of blogging, my blog was already on the front page for Clive Thompson. And about six or seven months later it was the number one slot. And now, I mean, I’ve just liquidated this guy.”

—Steve Mirsky, from the *Knight Science Journalism Fellowships Future of Science Journalism Symposium in Cambridge, Massachusetts*



February 22, 2008

Fabric Produces Electricity As You Wear It

Nanowires embedded in fabric produce small currents of electricity from the wearer's normal movement. Which could give a whole new meaning to the term 'running shorts.' Karen Hopkin reports.

On February 8, we told you about scientists who had created a device, worn over the knees, that could harvest the energy you otherwise waste while walking. But if high-tech kneepads aren't your style, perhaps you'd be interested in a power-producing sport shirt? Maybe something in a literal electric blue? Because in the February 14 issue of *Nature*, scientists from Georgia Tech describe a fabric that converts low-frequency vibrations into electricity.

The material was made by weaving together zinc oxide nanowires with regular textile fibers. (Although for some reason the scientists used Kevlar as their run-of-the-mill textile.) When the nanowires rub against one another, as they would while you were wearing the garment, they generate electricity. And because the wires are so small and thin, the material is quite flexible. So it could be woven into power-generating tents for soldiers—or into the ultimate power tie for the busy executive.

The scientists estimate that their nanoclothing can put out about 80 milliwatts of power per square meter of fabric. Which should be enough to operate your personal electronics. Best of all, if you buy the nanosuit made with Kevlar, you should be able to talk on your cellphone and survive getting shot.

—Karen Hopkin



February 25, 2008

Better Beams Give More Big Bang For Buck

Particle beams traveling at almost the speed of light get lined up after information going even faster tells devices to straighten things out. The result may provide information about the Big Bang. Cynthia Graber reports.

Physicists at the Brookhaven National Laboratory have been able to send information ahead of particle beams racing at nearly the speed of light. And the message to the beams is: Get in line. This technique has been developed at other labs but never used before with particle beams traveling in discrete bunches. These bunches are important in recreating that singular moment, the Big Bang.

In these experiments, there are two different sets of ions, electrically charged particles, zooming towards each other around a 2.4 mile track. They collide into one another to recreate conditions that provide info about the Big Bang. But the ions spread out as they move. And this means that there are fewer collisions.

In a technique called stochastic cooling, scientists first measure fluctuations in the beams of ions. Then they send signals even faster than these particles to devices up ahead that can kick these particles back into shape. Researchers say this technique allows them to create these collisions much more frequently and cheaply than other methods. And so they can get more and better data about what our universe might have been like just after it came into existence.

—Cynthia Graber



February 26, 2008

Nets Drive Evolution of Small Fish

In a test lake stocked with two types of trout, fishing with nets mostly caught larger, faster-growing fish, leaving smaller, slower growers to survive and pass on those traits. Karen Hopkin reports.

Being a big fish in a small pond is more likely to get you noticed. That's good news if you're, say, the best pitcher in your little league division. But it's not so good if you're an actual fish. Because bigger fish are the ones that tend to get caught. Not only is that bad news for the fish, but it may be bad for the whole fish population. Or so say scientists from Australia and Canada in the online edition of the Proceedings of the National Academy of Sciences. They find that fishing for the largest individuals targets the fastest growers, leaving behind their slower-growing counterparts. Which means that current fishing practices may favor the evolution of slower-growing fish.

The scientists stocked two small lakes in British Columbia with two strains of rainbow trout: one that grows quickly and is more aggressive in chasing down food and another that grows slowly and tends to be more cautious. They then used commercial gillnets to fish the lakes and found that they bagged the bolder fish three times faster than the shy ones, which were left behind to multiply. So we could inadvertently be breeding fearful small fry that are nearly impossible to catch. Which would make them...hard-to-see food.

—Karen Hopkin



February 27, 2008

Telescope Will Come To The Dark Side

Putting a giant radio telescope on the dark side of the moon will enabled an unparalleled "view" of the universe. Adam Hinterthuer reports.

Earlier this month, NASA announced that an MIT physics professor will lead a team of scientists on a new mission. The objective? Build a giant radio telescope on the far side of the moon. You see, long, long ago—before there even was a galaxy far, far away—the universe settled into a cosmic Dark Age. It was a billion year period following the Big Bang and it produced the structure of space as we know it. Astronomers have long hoped to detect the faint, low-frequency radio emissions generated from this time so they could learn more. But thanks to interference from the ionosphere, not to mention tons of radio and TV signals, Earth is a lousy place to hear.

Luckily, the moon rotates so that one side always faces out into space, making it free and clear of noise pollution. The MIT team will use automated vehicles to arrange hundreds of antennas across two square kilometers of the moon's quiet side. From this perch, they hope to hear the waves produced from the birth of the universe and get in tune with how it all came to be.

—Adam Hinterthuer



February 28, 2008

Conserving the Galapagos

Wind and solar power will do away with oil spills at the Galapagos, one of the science's most historic sites. Cynthia Graber reports.

The history of science is inextricably linked to the Galapagos and its influence on Darwin. In 2001, an oil tanker hit a reef in the Galapagos Islands and spilled potentially disastrous amounts of oil on one of the world's most historic nature reserves. Today, the Galapagos are starting down a path to do away with imported oil. Ecuador, which owns the islands, recently installed three wind turbines, in cooperation with the UN and major energy companies. Wind power will replace half of the diesel previously needed. But there are challenges.

First, the electrical grid must be updated to accommodate the intermittent power supplied by wind. And there are also ecological issues. One of the original proposed sites contained nests of birds known as petrels. But after they moved the site, researchers realized they knew little about the flight patterns of petrels. So they initiated a study. Once it was determined that the birds would fly safely out of the way of giant turbine blades, construction began. The addition of solar power could make the Galapagos nearly energy independent by 2015—and free from any further oil spills.

—Cynthia Graber