

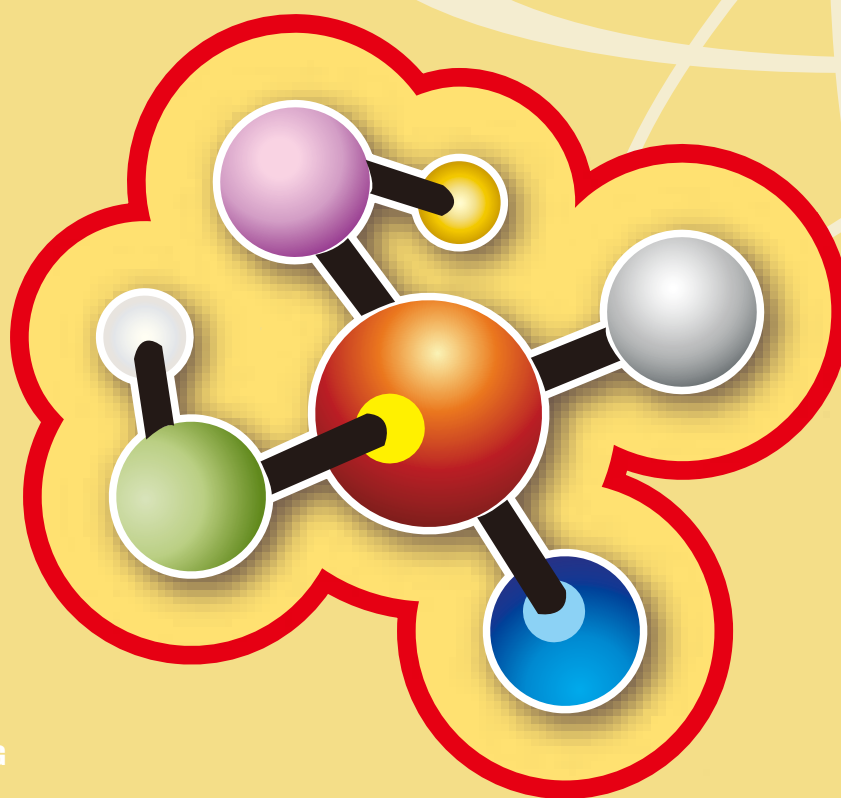


# SCIENTIFIC AMERICAN

## 60-SECOND SCIENCE

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# 60





June 2, 2008

## Sloths Not as Lazy as Thought

**In a study that illustrates the pitfalls of relying on research done on animals in captivity, biologists found that wild sloths slept far less than they previously thought. Karen Hopkin reports.**

*[The following is an exact transcript of this podcast.]*

Picture a sloth and what do you see? Some slow-moving, hairy beast, just hanging around, maybe even catching some Zs. And that's just your husband. Ok, seriously. We've all seen films of three-toed sloths, odd-looking creatures that spend their days hanging upside down in the rainforest canopy. They move so slowly that mossy looking algae actually grows on them. And legend has it they sleep like 16 hours a day.

But researchers from Germany and the U.S. have found that sloths might not be the slug-a-beds we think. Using equipment designed to monitor the brain waves of animals in the wild, the scientists found that sloths actually spend less than 10 hours a day asleep in the trees. Their results appear in the current issue of the Royal Society journal, *Biology Letters*.

Why the discrepancy? Well, the earlier estimate comes from work done with animals in captivity. And maybe in the sloth sleep lab, there's not much to do besides snooze. In the wild, on the other hand, the animals need to keep an eye open for potential predators, like snakes or birds. And they also spend time foraging for food. Because nobody's bringing a sloth any breakfast in bed.—Karen Hopkin



June 3, 2008

## Listening In on Night Birds

**Recording the unique calls of birds on nighttime legs of the spring migration will let researchers know where proposed wind power turbines should be placed. Steve Mirsky explains, with reporting by Adam Hinterthuer.**

*[The following is an exact transcript of this podcast.]*

You probably missed it because you were sleeping. But one of North America's great natural phenomena happened over the nights of mid spring. After sundown, the skies filled with millions of birds all traveling nighttime legs of their journey north. These overnight flyways were discovered during World War II, when Doppler radar was developed. Anxious military officials sounded false alarms over phantom air raids, but soon realized they were just watching flocks of songbirds.

There are calls that each species only makes during these night flights. This spring, Jeremy Ross from Bowling Green State University put microphones on top of buildings in Northern Ohio to record nighttime flybys. Birds use a chain of islands to hop from Ohio, across Lake Erie, to Canadian breeding grounds. Ross wants to know if proposed wind power farms might interfere. Using the volume of each call, Ross can calculate if birds are soaring safely above the blades of wind turbines. Something to consider with more wind power in the air.

—Steve Mirsky, with reporting by Adam Hinterthuer



June 4, 2008

## Iron Snow behind Mercury's Magnetism

**The core of Mercury may have flakes of iron falling like snow and initiating a global magnetic field. Cynthia Graber reports.**

*[The following is an exact transcript of this podcast.]*

On Earth, snow crystals, as we all know, form from frozen water. But scientists believe there are also flakes that fall on Mercury—and they're made of iron. They published their findings in the journal *Geophysical Research Letters*. Investigators have been trying to figure out why Mercury is the only other terrestrial planet in our solar system that has a global magnetic field. It's about one hundred times weaker than earth's. No previous models have been able to predict what would cause this type of situation. So researchers at the University of Illinois and Case Western University set up an experiment to try to figure it out.

They created a molten iron and sulfur mixture—similar to Mercury's core. They subjected the mix to high temperatures and pressures. Then they analyzed what happened in this Mercury model. Turns out that as the outer core cools, the iron forms what researchers call cubic “flakes” that slowly fall to the core's center. As the iron snow falls, the sulfur-rich liquid rises. Researchers believe these currents produce the weak magnetic fields—and Mercury's iron snow.

—Cynthia Graber





June 5, 2008

## Using Cell Phones to Track Humans

**Because you can't sedate humans and attach radio collars, scientists are studying human movements with cell phone records that reveal locations. Karen Hopkin reports.**

*[The following is an exact transcript of this podcast.]*

Generic Naturalist: Biologists traditionally track migrations by tagging animals with devices that allow their movements to be monitored. But *Homo sapiens* can't be fitted with radio collars. At least not without making them feel self-conscious and absurd.

Hopkin: It's not exactly Big Brother, but if you have a cell phone, scientists in Boston may be watching you. Or at least using your cell phone records to see where you go. Because people carry and use their phones every day, they provide a great way for researchers to get a handle on human migration. The Boston scientists looked at records from 100,000 cell phone users over a six-month period, determining individuals' positions based on which transmission towers handled their calls. They found that people are truly creatures of habit: they tend to make regular trips to the same few locations, like work, home or the local pizza place. The results appear in the June 5th issue of the journal *Nature*. Getting a good fix on people's comings and goings could help predict traffic patterns or even prevent epidemics.

Naturalist: Those same phone records show that Ray's Famous Original Pizza is clearly the human's first choice.

—Karen Hopkin



June 6, 2008

## Battling Exercise-Induced Breast Pain

**A study of motion during exercise finds that the speed of movement in all three dimensions is the key to breast pain while exercising. Cynthia Graber reports.**

*[The following is an exact transcript of this podcast.]*

For women who are rather well-endowed, working out can sometimes be, well, a bit of a pain. Finding a good sports bra is key. Now new research on breast pain from Britain's University of Portsmouth might provide some assistance in that search. Breast pain, it turns out, is related to the speed of movement, not the degree of up and down.

Sports scientist Joanna Scurr put 100 women on treadmills and attached sensors to their breasts. The women were asked to describe their pain or discomfort. And the movement of their breasts was measured, up and down, front and back, and side to side. Women claimed the most discomfort while speeding up and slowing down, which corresponded to the times their breasts were moving around the most quickly. Scurr says this means women should shop for a sports bra that cups each side individually. While typical sports bras flatten breasts and prevent that up and down movement, they don't protect from front-and-back or side-to-side motion. But bras with separate cups tame movement in all directions. And, Scurr hopes, ease discomfort for those of us on the more zaftig side.

—Cynthia Graber



June 9, 2008

## Grief Counseling Possibly Counterproductive

**Dealing with feelings on one's own after a community-wide traumatic event may be better than formal grief counseling. Karen Hopkin reports**

*[The following is an exact transcript of this podcast.]*

"You need to talk about your feelings." "Do you want to talk about it?" "We need to talk." Whether it's the aftermath of a failed relationship or the horrors of a school shooting, Americans do like to talk about things. Talking, we feel, is healthy. Talking will help us heal. But a study from the University of Buffalo suggests that talking's not the panacea we seem to think it is. Psychologists there have found that people who don't discuss their feelings after a tragedy actually fare better than those who do.

The researchers were studying the mental and physical toll of grappling with a community-wide trauma—in this case, 9/11. Shortly after the attacks, they offered participants an opportunity to share their thoughts. Some did, some didn't. Two years later, the scientists found that people who kept it inside were better off than those who let it all hang out. The findings appear in the June issue of the *Journal of Consulting and Clinical Psychology*. So maybe we should give the grief counselors a vacation. Turn on some music. Maybe take a walk. Feel our feelings. But not feel like we have to share them with everyone else.

—Karen Hopkin



June 10, 2008

## Nanotech Paper Sops Up Oil Spills

**A nanotech material absorbs oil but repels water, making it a possibly perfect picker-upper for tanker spills. Cynthia Graber reports.**

*[The following is an exact transcript of this podcast.]*

It might look and even feel like paper, but a new material created by scientists at MIT is designed to be an oil spill super-absorber. This technology debuted in a recent issue of *Nature Biotechnology*. Scientists designed a mesh of nanowires made of potassium manganese oxide. The mesh is dried in much the same manner as cellulose is treated to make paper. Between the nanowires are tiny pores that act like capillaries to absorb liquid—again, like a paper towel.

But the wires have a coating that repels water. In fact, researchers say this material can be left in water for a month and, when taken out, will still be dry. But oil can seep into those pores. The nanopaper can absorb twenty times its weight in oil. And it can be reused. Potassium manganese oxide is stable at high temperatures. So to clean it, researchers heat it above the boiling point of oil. The oil evaporates and the paper is clean again. About 200,000 tons of oil have polluted waters around the world in this decade alone. Scientists say this new nano oil cleaner could help sop up inevitable future spills.

—Cynthia Graber



June 11, 2008

## How the Brain Hears Over Din

**Research begins to unravel the cocktail party effect, in which you can somehow follow individual lines of conversation that you concentrate on, despite loud competing sounds. Christopher Intagliata reports.**

*[The following is an exact transcript of this podcast.]*

At a crowded party, it seems like it would be hard to hear the person you're talking to over all the clinking glasses, the chatter and laughter. But somehow, your brain filters out all the noise. Scientists have known about this useful ability for over 50 years—it's called the cocktail party effect. But they're still trying to figure out how the brain does it. A new study in the journal *Public Library of Science Biology* hints at an answer.

Neuroscientists played one repeating tone to volunteers, along with a bunch of louder, distracting tones of different pitches. The participants pressed a button if they heard the right tone. Meanwhile, the researchers were monitoring the subjects' brain activity. Turns out even when the subjects didn't think they could detect the repeating tone, it still traveled from the inner ear to the auditory cortex. Somewhere after that initial processing, though, it got discarded before the person was consciously aware of it. So all those other conversations at a party probably likewise make it into your brain. But they get thrown away before you're aware of them. Unless of course, you're eavesdropping.

—Christopher Intagliata



June 12, 2008

## Leaves Maintain a Constant Temperature

**In a surprising finding, leaves on trees from the tropics to the Arctic turn out to maintain a fairly constant, comfortable temperature. Karen Hopkin reports.**

*[The following is an exact transcript of this podcast.]*

With temperatures approaching 100 degrees in the eastern U.S. this week, it's amazing that the leaves on the trees don't simply go into flames. Maybe one reason they don't is that no matter how hot or cold it gets, leaves tend to maintain themselves at a nice, climate-controlled 70 degrees. That's according to a report in the online issue of the journal *Nature*.

Scientists had always assumed that the temperature of a leaf was the same as the surrounding air. And why wouldn't they? It's not like trees are warm-blooded. But University of Pennsylvania researchers examined leaves from 39 tree species in 25 different locations, ranging from inside the Arctic circle to the island of Puerto Rico. And they found that no matter where the leaf comes from, its average temperature is the same.

The explanation: leaves from the tropics have evolved mechanisms for keeping cool, say by angling themselves away from the sun. And trees in polar regions have come up with ways to heat their leaves, by putting out more leaves per branch, for example, so they can essentially huddle for warmth. After all, what choice does a tree have in bad weather? It can't just pack up its trunk and leaf.

—Karen Hopkin



June 13, 2008

## ADHD Genetics Sometimes Beneficial

**A study in Kenya finds that those with genes associated with ADHD who still live a nomadic life are actually more fit, but those who have adopted a more settled life are less fit. Cynthia Graber reports.**

*[The following is an exact transcript of this podcast.]*

If evolution weeds out detrimental traits, why do some seem to stick around? Well, what's bad in our current environment may have been good in the conditions under which we evolved. New research indicates that even the tendency toward attention deficit hyperactivity disorder may have been beneficial under the right circumstances. The study was published this week in BioMed Central.

Dan Eisenberg is an anthropologist at Northwestern University. He investigated two groups of the same tribe of Kenyans. One group still lives a traditional nomadic lifestyle and one recently settled in villages. About 20 percent of individuals in both groups have a genetic mutation that's associated with food cravings and ADHD. Eisenberg collected body mass index and height data of adult males. Those with the ADHD-associated gene who were still nomads were better nourished than those without the gene. But those with the gene who'd settled down were less fit. The ADHD-related gene may encourage behaviors beneficial for nomads. A boy with this allele might more effectively defend livestock or locate food and water sources. But maybe he wouldn't do so well at farming or sitting in a classroom.

—Cynthia Graber



June 16, 2008

## Fraidy Face Helps Survival

**The typical scared face boosts physiological functions, such as breathing and eyesight, that are critical in an emergency. Karen Hopkin reports.**

*[The following is an exact transcript of this podcast.]*

You've landed a small role in a low-budget horror movie. To get ready, you need to practice your reaction shot—you know, that look you'll get when your boss peels off his face to reveal the slime-oozing alien he really is. So, look in the mirror and give us some terror. If you're doing it right, your eyes are wide open and your eyebrows are raised.

But why is that? I mean, how come people, when they're scared, all make a similar face? Darwin thought there was a reason, that our expressions evolved because they offer some benefit. And scientists from Ontario think Darwin was right. They asked volunteers to try to look frightened and then they measured the physiological effects. They found that making a fraidy face allows people to see farther, locate targets faster and take in more air when they breathe. The findings appear in the current online issue of *Nature Neuroscience*. Those reactions make sense, because if you see something startling or out of the ordinary, you can use your fear-enhanced vision to assess the situation and, if need be, take a deep, fear-boosted breath—and run!

—Karen Hopkin





June 17, 2008

## Shhhh: A Real Cone of Silence

**Using materials that scatter sound waves, researchers think they have created a covering that could make an object completely soundproof. Cynthia Graber reports.**

*[The following is an exact transcript of this podcast.]*

When Harry Potter slips underneath his invisibility cloak, he can wander freely, undetected. But what about a cloak of silence, one that completely deadens sound? That's just what scientists from Spain's University of Valencia have designed, on a tiny scale. They wrote about their research in the *New Journal of Physics*. A paper published last year showed how such a cloak could be made in theory—researchers proposed using materials made up of what are called sonic crystals. These are solid cylinders that can scatter sound waves.

The Spanish scientists wanted to figure out the specs to make a real acoustic cloak that could totally reroute sound around a given object. According to their models, it would take about 200 layers of the sound-silencing materials to make it completely impervious to sound waves. They also think that they'll eventually be able to get the same effect with a thinner cover. Among the first applications could be a silent coating for naval ships, so that they're rendered invisible to sonar. But even more important could be wall coverings that would finally protect your ears from those annoyingly noisy neighbors.

—Cynthia Graber



June 18, 2008

## Wi-Maxing That Wireless Internet Connection

**A wireless technology called Wi-Max has a much bigger range than Wi-Fi, making it possible to supply wireless internet accessibility to large areas with a few base stations. Christopher Intagliata reports.**

*[The following is an exact transcript of this podcast.]*

Open your laptop in New York City and chances are you'll find a Wi-Fi hotspot to surf on. Not so in tiny Lone Pine, California, wedged between Death Valley and the Sierra Nevada mountains. Houses are spread out, not stacked, and Wi-Fi sure ain't a long-distance champ. That's why a lot of cities abandoned their ambitious plans for universal wireless coverage, explains wireless consultant Robert Morrow in a recent issue of *Science*.

Morrow writes that Wi-Fi will probably stick around in offices. But he says a different wireless technology called Wi-Max, developed about four years ago, could become the new standard for large areas with scattered users. Wi-Max avoids airwave interference by operating in licensed frequencies. And being licensed means Wi-Max stations can pump up transmitting power, expanding their range to a kilometer or more. That's 20 times the range of a Wi-Fi station, so an entire city could be covered by a score of Wi-Max base stations. And if tons of users swamp a Wi-Max station, it can redirect them to an uncrowded neighbor. So it looks like no matter how lost in the woods you get, you'll still be able to check your e-mail.

—Christopher Intagliata



## Physicists Explain Mentos-Soda Spray

**Physicists have finally determined the cause of the soda eruption resulting from the introduction of a Mentos mint: The rough surface of the mint tablet encourages the fast formation of carbon dioxide bubbles, which furiously escape the soda bottle. Karen Hopkin reports.**

*[The following is an exact transcript of this podcast.]*

Physicists study all kinds of curious things, from the missing matter in the universe to the strange behavior of electrons. But none of these is quite as curious, or dramatic, as what happens when you drop a Mentos into a bottle of Diet Coke.

You've probably run across the *YouTube* videos. A person, often wearing a lab coat and goggles, plops a mint into a bottle and, whoosh, a foamy jet of sticky soda sprays 20 feet into the air. Now physicists from North Carolina think they know why. They repeated the reaction using a variety of catalysts, from the classic Mentos to table salt, as well as a handful of solvents, including caffeine-free Coke and seltzer.

They found that what's going on is physics, not chemistry. The rougher the stuff that gets dropped in the fluid, and the faster it sinks, the more spectacular the eruption. Microscopic nooks and crannies encourage the growth of carbon dioxide bubbles. That carbonation fuels the geyser. And things that sink quick create lots of bubbles that seed even more bubbles as they rise. The explosive results appear in the June issue of the *American Journal of Physics*. It's not rocket science--unless the bottle's upside down.

—Karen Hopkin



## Humans Spreading Disease To Chimps

**Some human diseases originate in animals, but it now appears that we have been infecting chimps with a respiratory virus. Karen Hopkin reports.**

*[The following is an exact transcript of this podcast.]*

As you probably know, viruses can jump from animals to people. We've gotten flu from birds and pigs. And HIV, the virus that causes AIDS, is thought to have come from chimps. But swapping bugs is a two-way street. Because scientists from Virginia Tech have found that African chimps are coming down with human viruses.

The researchers have been studying chimps in the Mahale Mountain national park in Tanzania. And they've found that the apes are suffering from a respiratory illness that's caused by a virus very similar to the one that causes bronchitis and pneumonia in people. The results will appear in the August issue of the American Journal of Primatology.

How and where the chimps caught this bug remains a mystery. But it's possible they got it from scientists, or tourists, who frequent the park. The husband and wife research team, and their four-year-old daughter, have been living and working in the park for the past year in a state-of-the-art, eco-friendly field laboratory. There they hope to develop ways to monitor and protect the health of these endangered apes. Of course the best way to protect the chimps might be to remind visitors to sneeze into their sleeves and avoid being too simpatico with the simians.

—Karen Hopkin



June 23, 2008

## Non-Abbie Hoffman Radical Found on Venus

**A radical--a highly reactive chemical--found in Venus's atmosphere will help planetary scientists better understand the planet. Steve Mirsky explains, with reporting by Harvey Black.**

*[The following is an exact transcript of this podcast.]*

On June 4th, we told you about iron snowflakes on Mercury. Today we have some radical news about the atmosphere of Venus. Literally. A radical is a molecule that reacts easily with other chemicals because of an unpaired electron. Astronomers have found the hydroxyl radical in the Venusian atmosphere. Hydroxyl is oxygen with a single hydrogen,  $\text{H}_1\text{O}$ , if you like.

The Venus Express Probe discovered hydroxyl in the clouds that shroud the planet. Researchers from the European Space Agency announced the finding in the journal *Astronomy & Astrophysics Letters*. Hydroxyl's important on earth because it promotes the formation of ground level ozone, a pollutant. Finding the radical on Venus will help scientists test their models of Venus's atmosphere. Hydroxyl also exists in the thin Martian atmosphere, where it's thought to stabilize carbon dioxide and prevent it from becoming carbon monoxide. It may also be responsible for sterilizing the red planet's top layers of soil.

—Steve Mirsky, with reporting by Harvey Black



June 24, 2008

## Where You Vote Can Affect How You Vote

**A study finds that people who voted in school buildings were more likely to support ballot initiatives for funding education. Karen Hopkin reports.**

*[The following is an exact transcript of this podcast.]*

Location, location, location. We all know it's true of real estate. But it may also apply to the ballot box. Because a team of American researchers has found that where people vote affects how they vote. The scientists looked at results from the 2000 general election. In Arizona that year, the ballot included an initiative to raise state taxes to support education. What they found is that people who happened to be voting in a school building were more likely to vote for the proposal than people who voted at a firehouse or a church. Their results appear in the June 23rd issue of the Proceedings of the National Academy of Sciences.

And same thing happened in the lab. Subjects were shown a series of images, some of which pertained to schools. Later on, in what they were told was an unrelated experiment, they were asked to vote on funding for education. Folks who'd looked at lockers were more likely to vote yes. Whether voting in a church might affect where people stand on gay marriage or stem cell research remains to be seen. But it's probably a good thing that more people don't cast ballots in diners—might make it impossible to get rid of all that political pork.

—Karen Hopkin



June 25, 2008

## Just Smelling Coffee Helps Head

**Sleep-deprived rats that merely smelled coffee had genes activated in their brains that eased stress. Steve Mirsky explains, with reporting by Harvey Black.**

*[The following is an exact transcript of this podcast.]*

That morning coffee is just the thing to get the brain in gear and the body moving. But it turns out that just the aroma of coffee also gets some of our genes up and at 'em. That's according to research in the June 25th issue of the Journal of Agricultural and Food Chemistry. The authors report that a sniff of coffee turns on several genes in the brain in ways that help diminish the impact of sleep deprivation. In rats, at least.

Rats that were stressed by lack of sleep were exposed to the smell of coffee. Seventeen different genes got activated in their brains. And thirteen of them produced proteins known to protect nerve cells from the damaging effects of stress. While there have been numerous studies analyzing the health impact of the ingredients ingested when drinking coffee, the researchers say that this is the first study to examine the effects of coffee's aroma. So maybe you don't have to shell out that four dollars for the latte—just walk by the counter...[old TV ad: "smell the honest coffee smell, ahhh, smell it!"]

—Steve Mirsky explains, with reporting by Harvey Black



June 26, 2008

## Even Poor Kids Are Social Network Savvy

**Students from low-income families are finding ways to go online and engage in social networking. They may be learning valuable skills in the process. Christopher Intagliata reports.**

*[The following is an exact transcript of this podcast.]*

Ten years ago, MySpace didn't exist. Neither did Facebook. Just one site, called SixDegrees.com, dominated the online social networking market. But soon a bunch of sites sprouted up: LiveJournal, Friendster, LinkedIn, MySpace, and in 2004, Facebook. Back then, Facebook was just for Harvard kids.

But a new study from the University of Minnesota says these days even the least privileged kids have profiles on MySpace and Facebook. And they're on the internet all the time. That finding goes against past studies that have found a 'digital divide' between rich and poor kids.

The researchers surveyed 600 urban teens from families making less than \$25,000 a year. Nearly all the kids said they go online, usually from home. And more than three quarters of them have pages on MySpace or Facebook. The students say they've learned valuable technology skills in the process: they edit and upload photos, videos and music, and some of them even mess with html to personalize their pages. The researchers say teachers might want to build on that experience. Slipping a little MySpace between reading and 'rithmetic could be really rewarding.

—Christopher Intagliata





June 27, 2008

## Big Bird Relationships Revision

**DNA studies have led to a major revision in the ordering of relationships among the world's bird species, published in the journal *Science*. Cynthia Graber reports.**

*[The following is an exact transcript of this podcast.]*

For the last five years, researchers have been analyzing bird DNA. That effort has now completely altered our understanding of which bird species really do flock together in evolutionary history. The overall project is called Assembling the Tree of Life, with the avian part known as Early Bird. The new relationships appear in the June 27th issue of the journal *Science*.

It turns out much of what we thought about how bird species were related to one another was just wrong. For example, scientists thought that birds that live on water, like flamingos, evolved from a separate waterbird group. But flamingoes took to the water after speciating. And it might make sense to think that birds with similar lifestyles, like falcons and eagles, were related. Nope. Instead, falcons are more closely related to parrots.

Researchers found other surprising relatives—colorful hummingbirds that flit about when the sun shines descended from drab, nocturnal nightjars. Get ready for Latin species names to change. And textbooks and field guides will have to be revised to correct former assumptions about relationships. The 82 million American birdwatchers will certainly go cookoo.

—Cynthia Graber