SCIENTIFIC AMERICAN

60-SECOND SCIENCE

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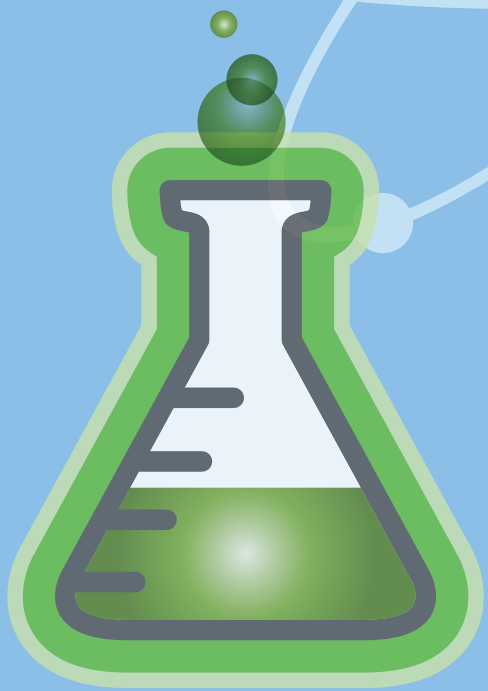

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July 1, 2009

Why Didn't Earth Freeze Completely?

Research published in the July 2 issue of *Nature* reveals one reason our planet didn't succumb to an enveloping ice sheet during glacial ages. Christie Nicholson reports

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

During the last ice age our problem was too little carbon. Unlike today where too much carbon is causing global warming.

Past glacial ages occurred partly because the weathering of rocks, over millions of years, pulls CO2 from the atmosphere, locking it in ocean floor sediment. The rise of global mountain ranges during the last 25 million years should have sucked all the CO2, sending the Earth to an icy death.

But that never happened. CO2 levels stabilized at about 250 parts per million.

This week in the journal *Nature*, researchers announce one reason why this happened: plants.

Leafy greens need CO2 to live, and when CO2 levels drop significantly they starve. Researchers say that the plant numbers decreased to a level where volcanoes and other carbon-creating sources produced CO2 faster than the remaining plants could remove it. So the Earth remained somewhat warm.

It may seem that our leafy friends could help us now, this time from overheating. But ultimately we're producing too much CO2 too fast for natural weathering processes to remove it. Ultimately, we need a way to stop producing CO2 in the first place.

—Christie Nicholson

SCIENTIFIC AMERICAN

July 2, 2009

Rain Zone Moving North

An article in *Nature Geoscience* predicts that the rainiest area on Earth, the intertropical convergence zone, is moving steadily north. Christie Nicholson reports

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

If you've spoken to anyone in New York City—where *Scientific American*'s offices are—then you've heard about the rain, every day since mid-June.

Still, we're not in the intertropical convergence zone, an area just north of the equator stretching across the Pacific that builds rain clouds 30,000 feet thick releasing as much as 13 feet of rain annually.

But the rainiest place on Earth might reach us, eventually. Researchers report in the journal *Nature Geoscience* the zone is moving north at a rate of nearly a mile per year.

It's important because it supplies freshwater to a billion people in the tropics.
Researchers studied Washington Island in the Pacific that gets 10 feet of rain annually. Core samples revealed that it was desert-like only 400 years ago. A similar situation was found in Palau, now in the heart of the convergence zone. Also, the now arid Galapagos Islands had a very wet climate about 400 years ago.

Researchers predict that this zone will be more than 75 miles north of its current position as early as midcentury, having profound economic and cultural implications for those who currently depend upon it.

—Christie Nicholson

SCIENTIFIC AMERICAN

July 3, 2009

Genetic Link for Perfect Pitch?

Recent research claims to have found some evidence for a genetic link to perfect pitch. Christie Nicholson reports

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

We might think perfect pitch is an innate talent. Well, a study in the American Journal of Human Genetics is providing some evidence for that.

Perfect pitch, aka absolute pitch, is the rare ability to name or recreate musical notes like A or middle C without using any comparable reference.

Researchers at the University of California, San Francisco, studied the results from an online test taken by over ten thousand people. Not surprisingly, individuals tended to either have perfect pitch or not.

But in a closer study of 73 families researchers found a region of genes on chromosome eight in those with perfect pitch and from European ancestry. More study is needed to zero in on just which gene or multiple genes might be responsible. And for comparison they intend to study individuals without perfect pitch but with equivalent musical training.

There is some evidence that babies have the ability for absolute pitch, so researchers for this study theorize that maybe most lose this ability with age, but that what a so-called pitch gene does is extend this talent through a crucial period in childhood.

—Christie Nicholson

SCIENTIFIC AMERICAN

July 6, 2009

Future of Science Coverage

At the World Conference of Science Journalists in London last week, outgoing *Scientific American* Editor in Chief John Rennie talked to writers about the future of what they do, remarks that also pertain to this podcast. Steve Mirsky reports

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

At the World Conference of Science Journalists last week in London, outgoing *Scientific American* Editor in Chief John Rennie talked to writers about the future of what they do, remarks that also pertain to this podcast:

The question then is, how could science writing for the public possibly be better? I think there are a couple of different ideas. One of them is, maybe there should just be less of it. And because I would like to leave this room unlynched, let me amend that to say that at least there should be less of some of it. If our job is, ultimately as we see it, to try to inform the public better about science and technology, I for one think that we could all do with a lot fewer of the "what causes/cures cancer this week" story.

I think that in fact is directly related, that kind of story is really related to a different problem, which is that we have a model of following what defines science news as that 95 percent of the time it is "interesting paper that appears in prestigious journal this week." That constitutes science news. Except that we're all smart enough to know that that has absolutely nothing to do with how science works. That has to do with how publishing works. That's what did they put into press this week.

Science actually doesn't change when one, new important paper comes out. We all know that. The reality of science is it takes time for science to play itself out. When interesting new results come in, they're tested and they're confirmed and people rework them. One paper can be the landmark that starts to affect some of that, but the reality is the actual change in the science follows that often by a considerable amount of time. Sometimes long after we've actually written the big headlines about the exciting, dramatic, revolutionary change of whatever has come about because of something.

And I think that's something that I don't have a particular prescription on all of this. But I really think this comes down to why it is that we have a responsibility as editors to try to rethink what counts as science news. —Reported by Steve Mirsky

SCIENTIFIC AMERICAN

July 7, 2009

Really Mass Media

In London last week at the World Conference of Science Journalists, Philip Hilts, the director of the Knight Science Journalism Program at M.I.T., reviewed the worldwide state of Internet and cell phone use, two of the major ways people now get news

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

Ever increasing numbers of people are consuming news via the internet and cell phones. In London last week at the World Conference of Science Journalists, Philip Hilts, the director of the Knight Science Journalism Program at M.I.T., reviewed the worldwide state of Internet and cell phone use:

“Internet use, it’s about 1.5 to two billion internet users, subscribers. And so there’s this discussion about, well, we have it in North America but Africa’s not got it, so we’re on two different planets and so on. That’s true, 5.6 percent in Africa now, 17 percent in Asia, but this is moving very rapidly. In Africa it’s growing 12 times right now. In Asia it’s growing almost six times right now. So the greatest growth is where we’re short in penetration.

“Cell phone use where news will be also as the smart phones get around the world and as Africa gets wired up, the cables are now going in that will be useful in Africa, they haven’t been there. 1980, we had 11,200,000 cell phone subscribers which was zero penetration. And we’re looking at 60 percent penetration now, 4.1 billion subscribers. China and India is the core of cell phone usage on Earth, and then it goes on down from there, U.S., Brazil, Japan, U.K.”

—Reported by Steve Mirsky

SCIENTIFIC AMERICAN

July 8, 2009

Are Parasites to Thank for Sex?

A study in the journal *The American Naturalist* implies that parasites helped drive the development of sex, because the shuffling of genes gives sex-produced progeny an advantage over asexual genetic clones. Cynthia Graber reports

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

Sex might seem like one of those little gifts from evolution. But it's pretty inefficient from an evolutionary perspective. It'd be much easier to reproduce if you could do away with finding the right member of the opposite sex to help you create the next generation. So why *did* evolution come up with sex?

Biologists have hypothesized that one driving force might have been parasites. Now scientists have had a chance to test that theory. Asexual reproduction leads to clones. Being genetically identical, clones are also weak in the same ways, and thus more likely to all succumb to a parasite. But sex keeps shuffling the genetic deck.

Well, there's a snail common in New Zealand lakes that does both—some populations have sex and some reproduce asexually. So researchers spent 10 years monitoring the two populations, and the number of parasites living off both groups. As expected, cloned snails that were plentiful at the beginning of the study suffered big losses as they became infected with parasites. But the sexual snail populations remained stable, results published in the journal *American Naturalist*. So, next time you're feeling sexy, thank a parasite.

—Cynthia Graber

SCIENTIFIC AMERICAN

July 9, 2009

Poll: Science, Though Beneficial, Losing Importance

The American public likes science, but thinks that its achievements are less important than they were a decade ago. That's according to telephone surveys conducted by the Pew Research Center and the American Association for the Advancement of Science. Steve Mirsky reports

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

The results are in, and, Americans pretty much like science. Eighty-four percent of those polled think that "science's effect on society" is mostly positive. That's the result of two phone surveys conducted by the Pew Research Center and the American Association for the Advancement of Science, released on July 9th.

Seventy-three percent believe that federal funding of basic research pays off in the long run. But the public's rating of the overall significance of science seems to have dropped in the last 10 years. In 1999, 47 percent of those polled said that scientific advances were among the most important U.S. achievements. Today, only 27 percent think so.

And Americans are aware of scientific info much more when it's related to their daily lives and health. For example, 91 percent know that aspirin's an over-the-counter drug sometimes used to prevent heart attacks; only 46 percent can tell you which are bigger, electrons or atoms.

To gauge your general basic science knowledge, including on the atom/electron question, take the test at pewresearch.org/sciencequiz

—Steve Mirsky

SCIENTIFIC AMERICAN

July 10, 2009

Shell Shock: Turtle Development Secret Revealed

A study in the journal *Science* tracks the embryonic development of the turtle's shell, which includes the shoulder blades getting folded within the ribs. Cynthia Graber reports

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

It sounds like the title to a Rudyard Kipling tale: how the turtle got its shell. But it's actually a question that has puzzled scientists. After all, no other animal, living or extinct, has a similarly constructed bony shield surrounding its body. Scientists had thought that, over evolutionary time, small bony plates fused with the animal's skin. But a new study published July 10th in the journal *Science* offers a different pathway.

In most animals the shoulder blades lie outside the ribs. Not so with turtles. And there's no intermediate evolutionary form in which the shoulder blades lie beneath ribs. So researchers in Japan compared chicken, mouse and Chinese soft-shelled turtle embryos at different stages of development. They show that initially the embryos develop along the same pathways. But the turtle takes a turn.

As it develops, part of its body folds in on itself. Shoulder blades get folded within the ribs. The ribs stay connected, but new connections also develop between bone and muscles. Then the shell starts to develop as the ribs fuse together and encase the shoulder blades. Not as droll perhaps as a "Just So" story. But more fascinating for being true.

—Cynthia Graber

SCIENTIFIC AMERICAN

July 13, 2009

Profanity Bleeps Physical Pain

A study in the journal *NeuroReport* finds that using socially unacceptable "swear words" has physical effects that enable the swearer to tolerate pain better. Adam Hinterthuer reports

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

Holy @$#%! According to neuroscientists from Britain's Keele University, dropping the f-bomb can actually relieve physical pain. In the upcoming August 5th issue of the journal *NeuroReport,* the researchers say swearing is a different phenomenon than most language. It activates emotional centers in the right side of the brain, rather than those &#*@ing cerebral areas reserved for regular #$#y communication in the left hemisphere.

The researchers had groups of undergraduate students submerge their hands in a tub of witch$@&#* cold water and repeat the swear word of their choice. And students could tolerate the icy abyss much longer than when they were only allowed to say more socially acceptable words. The researchers say the foul-mouthed students also had increased heart rates, which indicates that swearing activates a &#*@ing classic "fight or flight" response. You know, when you act all bad$(# to downplay the fact that you're scared @$#%^ss.

The study suggests that swearing is an ancient social phenomenon with both emotional and physical effects. And also that socially acceptable words don't mean @$#% when your pain really hurts like a son-of-a-%@&$#.

> Related Article: Why the #$%! Do We Swear? For Pain Relief

—Adam Hinterthuer

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July 14, 2009

Cat Call Coerces Can Opening

A study in the journal *Current Biology* finds that some cat purrs include a high-frequency plaintive component that gets people to do cats' bidding. Karen Hopkin reports

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

Anyone who's ever had a cat knows how demanding they can be. Let me out, let me in, give me food, give me different food. The list goes on. But how do these clever kitties convince us to do their bidding? A study in the July 14 issue of *Current Biology* suggests it's all in how they ask.

Karen McComb of the University of Sussex started studying persuasive cat calls after realizing that her own pet used a hybrid between a purr and a cry to get her out of bed in the morning. McComb got recordings of other cat calls. And back in the lab, she found that humans thought purrs made by cats who were trying to solicit a snack were more urgent, and less pleasant, than those made when kitty was, say, relaxing on the sofa.

Turns out that the "feed me" purr includes a high-frequency component, absent from the contented purr, that makes people want to reach for a can opener just to make Fluffy stop. It's obviously part of "Fluffy's Master Plan (song) for World Domination."

—Karen Hopkin

SCIENTIFIC AMERICAN

July 15, 2009

The Myth of Multitasking

A study in the journal *Neuron* shows that when we think we're getting better at multitasking, we're really getting faster at switching back and forth between two different things at different times. Karen Hopkin reports

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

Modern humans are masters of multitasking. We eat while driving, watch TV while studying, and of course talk on our cell phones while doing, well, everything. How do we do it? A study in the July 16th issue of *Neuron* suggests that though we can train our brains to work faster as we juggle, we never actually manage to do more than one thing at a time.

Our brains aren't really built to handle the sort of parallel processing we think we're capable of. The good news is: studies have shown that extensive training can make us better at doing two things at once. But how?

One theory is that with lots of practice some routines become "automatic." And if we don't need to run every little thing past the part of the brain that's spends time thinking about stuff, we can multitask just fine.

But this new study finds that that's not the way it works. Turns out that multitaskers still consult the prefrontal cortex, but training gets the "Thinking Brain" to think a little faster. So we're switching tasks quickly enough to appear to be doing them simultaneously. Which is still nothing to shake a stick and sneeze at.

—Karen Hopkin

SCIENTIFIC AMERICAN

July 16, 2009

Wastewater Analysis for Drug Abuse Evidence

A study in the journal *Addiction* shows that a viable system for measuring the consumption of illegal drugs in various communities is to analyze samples of untreated wastewater--which contains the leftovers. Steve Mirsky reports

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

If authorities wanted to determine how pervasive the problem of illicit drug use was in their communities, how could they do it? One cheap and easy way has just been tried experimentally in Oregon. Based on the principle that what goes in must come out, researchers measured the amounts and kinds of drugs that made their way through users to become included in untreated wastewater. This first-of-its-kind research is reported in the journal *Addiction*.

Ninety-six municipal water treatment facilities across Oregon volunteered for the study, which concentrated on finding evidence of the drugs meth, cocaine and ecstasy. All samples were collected on the same day, in areas that include about two-thirds of that state's population.

Some findings: evidence for cocaine use was primarily in urban areas, almost nonexistent in rural regions; ecstasy use tended toward urban areas as well, and only turned up in about half of all communities; meth was everywhere. More important than those one-day snapshot findings, however, is that this methodology was proven viable, and could be used to track patterns of drug use in multiple regions over time.

—Steve Mirsky

SCIENTIFIC AMERICAN

July 17, 2009

Jockey Positions Speed Up Horses

A study in the journal *Science* claims that the movement of jockeys out of phase with their horses eases the horse's workload and accounts for up to 7 percent of the decrease in race times over the last century. Karen Hopkin reports

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

[Horse race bugle]

Horse racing is a sport that's 200 years old.

[Horse race announcer sounds]

And a day at the track is much more exciting now than it was back then.

[Horse race announcer sounds]

That's because horses are faster than they used to be. Or are they? A study in the July 17th issue of Science shows that it's the way that jockeys ride that's made racing more heart-pounding than before.

Images from the late 1800s show that the boys in silks looked pretty relaxed as they went along for the ride. But modern jockeys—crouching, tightly coiled atop their galloping steeds—actively work to make sure their weight doesn't slow things down. Using GPS to track the riders' motions, scientists found that jockeys move out of phase with their mounts. That means that the horse doesn't have to physically move the jockey through each cyclical stride. As a result, races are five to seven percent faster than they were 100 years ago.

[Horse race announcer sounds]

—Karen Hopkin

SCIENTIFIC AMERICAN

July 20, 2009

Aldrin Dusts Off Moon Memories

Buzz Aldrin recalls the simple strangeness of being on another world, such as how the dust rose and fell differently on the moon with each footfall. Steve Mirsky reports

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

It's the 40th anniversary of the first humans setting foot on the moon. Last August, I interviewed one of them, Buzz Aldrin, in the lobby of a hotel he was staying at in Manhattan. Near the end of our conversation I asked him to get a little existential: "What was the actual experience of being up there? Did you have any time to just say, 'This is unbelievable?'"

Aldrin: "Well, there is no way to recreate or really anticipate the visual that we were given. You just couldn't project ahead that you are going to see unusual things like putting your foot down and the dust goes out and kind of lands in a different way. Things behave differently up there."

To hear the entire interview with Buzz Aldrin, just go to snipurl.com/buzzaldrin

It includes a discussion of how his doctoral thesis work at M.I.T. on guidance techniques for manned orbital rendezvous wound up coming into play during actual missions that he took part in as an astronaut.

—Steve Mirsky

SCIENTIFIC AMERICAN

July 21, 2009

Raindrop Sizes Surprises

A study in the journal *Nature Physics* shows that raindrop size distribution is a function of large drops disintegrating as they fall. Karen Hopkin reports

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

When you get caught in a downpour, you probably don't think about the size of the raindrops that assault you as you run for cover. But physicists do. And they've come to the conclusion that the drops that hit the ground, or your head, are the shattered remains of bigger drops that fell from the clouds.

Raindrops come in a variety of sizes, even within the same storm. And scientists used to think that, to get that kind of distribution, raindrops must crash into each other on the way down, breaking up into smaller droplets or coalescing into larger ones. Now a team of French scientists has produced high-speed footage of falling water droplets. And they find that drops of different dimensions don't require collision—they come from the fragmentation of individual, isolated droplets. Their results appear online in the journal *Nature Physics.**

The video evidence reveals that water droplets first flatten out as they fall. And as these plummeting pancakes get wider and thinner they eventually capture air, forming what look like little plastic grocery bags floating in a breeze. And when the bags get big enough, they pop. And you're left wondering why you can never remember your umbrella.

—Karen Hopkin

SCIENTIFIC AMERICAN

July 22, 2009

What's on TV Is Biomedical Bonus

A study in the journal *Green Chemistry* shows that a substance recovered from old liquid crystal displays, PVA, has multiple medical uses. Cynthia Graber reports

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

When TV sets die, they usually end up incinerated or in landfills. But now researchers from England's University of York believe they've found a valuable use for told TVs—in medicine.

Liquid crystal displays—or LCDs—are becoming increasingly popular. One key component of the display is a compound called polyvinyl-alcohol, or PVA. The researchers recovered the PVA from television screens. They then heated the material in water with microwaves, cooled it back down and washed it with ethanol. That process creates a new material called expanded PVA. And our bodies fail to mount an immune response against expanded PVA, so it's a good substance for biomedical applications.

It's porous with a large surface area, so the expanded PVA is a good material for cellular scaffolding that can be implanted and on which tissues can regenerate. It can also be used for pills and dressings that deliver drugs. The research was published in the journal *Green Chemistry*.

The study authors say billions of televisions with LCD technology are nearing the end of their lives. Which means that medical dramas that once played out on the TVs may soon come from the TVs.

—Cynthia Graber

SCIENTIFIC AMERICAN

July 23, 2009

Artificial Gravity Slows Muscle Loss

A study in the *Journal of Applied Physiology* found that spinning bedridden volunteers in a centrifuge to mimic gravity stopped the muscle loss associated with weightlessness. Steve Mirsky reports

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

[Captain Kirk:] “Would you mind telling me what this is all about, Mister?” No problem, Captain. A study in the *Journal of Applied Physiology* shows that artificial gravity should prevent a big problem faced by astronauts who stay weightless for extended periods. [Kirk:] “Are you a doctor?” Well, no, but I know the weightlessness problem: muscle decay.

Fifteen healthy men spent three weeks lying in bed. Such inactivity produces similar muscle losses as weightlessness. But eight of the volunteers were spun around in a NASA centrifuge 30 times a minute for an hour each day. The forces produced are equivalent to standing up in about two and a half times normal gravity. The spun guys kept making leg muscle proteins normally. But muscle production in the unspun group was cut almost in half.

The study has implications for elderly people here on Earth. [Kirk:] “I’m 34 years old.” Actually, if today’s 78-year-old Shatner were hospitalized, he’d quickly lose muscle. But getting Bill to stand up and move just a little each day could help him ward off muscle decay. [Kirk:] “What are we doing here?” [McCoy:] “Maybe they’re throwing us a retirement party.” [Scotty:] “That suits me, I just bought a boat.”

—Steve Mirsky

SCIENTIFIC AMERICAN

July 24, 2009

Fish Shrink to Beat Heat

A study in the *Proceedings of the National Academy of Sciences* finds that the planet's warming oceans are inducing fish to get smaller as a strategy to deal with increased temperature. Karen Hopkin reports

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

Forget the meek. If the Earth keeps getting warmer, a recent study shows that it's the small that are gonna come out on top—at least in the world's oceans. With global temperatures on the rise, scientists are trying to figure out what a warmer earth will mean for worldwide ecosystems. In aquatic environments it seems two responses have already come into play. First, species are seeking higher altitudes and latitudes so they can stay in their comfort zones. Second, organisms are shifting key events in their life cycles, like when algae bloom or fish spawn.

Now researchers writing in the *Proceedings of the National Academy of Sciences* have discovered a third rule, if you will, that governs how fish and other ocean-dwelling critters are working to beat the heat: they're shrinking. Makes sense because a smaller body means a bigger surface area to body volume and more efficient heat dumping. The researchers reviewed long-term surveys and other published results and found that the number of smaller-sized species is on the rise. And that within each species, fishes of every age are just a little bit littler than they used to be. Holy miniature mackerel.

—Karen Hopkin

SCIENTIFIC AMERICAN

July 27, 2009

Toucan: Put Heat on My Bill

A study in the journal *Science* finds that at least one purpose of the giant bill of the toucan is to radiate heat. Adam Hinterthuer reports

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

The toucan's long bill has long perplexed biologists. Darwin theorized that it attracted mates. Other suggested uses ranged from fruit peeling to territorial defense. But a report in the July 24th issue of the journal *Science* offers another explanation as to why one-third of the bird is all shnoz. The authors of the report say the toucan's bill is so big because it acts like a radiator strapped to its face. When a toucan needs to cool down, its beak heats up. The immense surface area of the beak allows heat to quickly dissipate. In fact, the scientists say, as a toucan lowers its body temperature in preparation for sleep, it can cool 10 degrees Celsius in just minutes.

The scientists used infrared thermography, the same kind of technology used in heat-sensing cameras, to observe toucans at different ambient temperatures. When outside temperatures rose, the bill also heated up, but the bird’s core body temperature did not. The scientists speculate that other big-billed birds may regulate their body temperatures this way. Since birds don’t sweat, having a handy heat dissipater undoubtedly keeps their feathers from getting ruffled.

—Adam Hinterthuer

SCIENTIFIC AMERICAN

July 28, 2009

How Orangutans Traverse Treetops

A study in the *Proceedings of the National Academy of Sciences* reveals the secrets to how heavy orangutans travel through the trees without breaking branches and plummeting. Karen Hopkin reports

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

Why did the orangutan cross the forest canopy? Presumably, to reach some tasty fruit. But the better question might be: how did the orangutan cross the forest canopy. And according to a study published in the *Proceedings of the National Academy of Sciences,* the answer is something of a surprise.

Large apes that spend a lot of time in the treetops face a major challenge in getting to their food: how can they maneuver their bulk over those spindly little outermost branches, which hold all the best fruit? Scientists had predicted that the best way to navigate the canopy would be to swing underneath the branches, or to crawl over them carefully with knees and elbows flexed.

But orangutans have a different approach. They like to mix it up. Sometimes they move upright, sometimes horizontally with their limbs fully extended. They avoid repetitive motions, which could make their perches sway even more precariously. And they tend to grab on to more than one branch at a time—a third of the time they've got hold of more than four at once. Which is good because the apple might not fall far from the tree, but an orangutan doesn't want to fall at all.

—Karen Hopkin

SCIENTIFIC AMERICAN

July 29, 2009

Bigger Bodies Better in Pool

A study in *The Journal of Experimental Biology* shows that larger, heavier athletes have an advantage in sports far removed from football or basketball: bigger bodies are better even in swimming. Cynthia Graber reports

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

When Michael Phelps is out of the water, he towers over mere non-Olympic mortals. Then he slips into the pool, and makes record-breaking speed seem effortless. His height, it turns out, is no accident. According to research published in *The Journal of Experimental Biology,* winning athletes are getting taller, more slender, and yet heavier in comparison to the normal population.

Since 1900, the average person's height has gone up by about two inches. But winning swimmers are four and a half inches taller than their old-time counterparts.

Researchers applied mathematical models of animal locomotion to show why height gives them a competitive advantage. Coaches have said in the past that swimmers should lift their bodies out of the water because air has less drag. But researchers showed that larger bodies fall faster and more forward in the water and create a larger wave that helps push them ahead.

The authors suggest that in the future we might need weight classes for all sorts of sports, not just boxing or wrestling. That might give one of the shorter guys a chance to win an Olympic swimming event even with Michael Phelps in the race.

—Cynthia Graber

SCIENTIFIC AMERICAN

July 30, 2009

Brain's Moving Experience When Reading

A study in the journal *Psychological Science* finds that reading about an activity activates the same brain regions involved in performing that activity. Karen Hopkin reports

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

Remember Dick and Jane? And their dog Spot? Maybe you read about them in first grade. See Spot run. Run, Spot, run! Well, a new study in the journal *Psychological Science* suggests that not only did you see Spot run, but you ran, too. At least in your mind. Because reading about something turns on the same brain regions that control doing that thing.

For years, scientists have suspected that our brains simulate the activities we read about. In behavioral studies, people who are reading about scoring a soccer goal react more quickly when asked to make a kicking motion than when told to, say, pat their heads. Now, researchers have used real-time brain-imaging techniques to watch what happens when people read a story. Twenty-eight subjects took in tales from a day in the life of Raymond, a seven-year-old boy who does things like get out of bed and sit through an English lesson. Sure enough, when Raymond scurries to his school desk, cells in the readers' brains that govern scurrying also spring to life.

Fortunately, the copycatting is confined to the brain—we don't actually act out the things we read about. If we did, you wouldn't want to sit next to someone skimming the daily paper.

—Karen Hopkin