

# New Life for Old Horns

Computer Science

Angela Palmer, 2007 (2)

If we could play 18<sup>th</sup> century composer J.S. Bach's famous organ piece, Toccata and Fugue in D Minor on this page, it would sound familiar to you. As would the organ. And, if we played another Bach tune with the lituus....wait. Lituus?

Almost 300 years ago, Bach wrote music for the lituus, an instrument that was soon forgotten — until now. Historians at a Swiss music school, Schola Cantorum Basiliensis (scb), decided to recreate the horn and Bach's original music. No illustration of the horn exists. No one alive has ever heard it played. Enter computer scientists.

scb researchers asked Alistair Braden and Murray Campbell from the University of Edinburgh in Scotland to build a lituus. Dr. Braden had developed a computer program to design modern brass instruments.

"The computer tells a horn maker how changing the horn's shape will affect the sound," Dr. Campbell says. "It can try out hundreds of different shapes, and tell us which ones are worth building."

The program can tell trombone makers how to change the shape of the tube or the type of material so they can make the instruments sound better. Or, in the case of the lituus, how to build an instrument based on the notes Bach wrote for it, how musicians might have played it, and what horns were probably similar.

"There is a Swiss instrument called the alphorn which is a kind of wooden trumpet, but [the scb] thought the tube was too wide," Dr. Campbell says. "They wanted a horn half way between a trumpet and an alphorn." The recreated lituus is about 2.5 meters long, made of pine, and straight with a flare at the end. And apparently, no one has written any new music for the lituus. Yet. ↵

— Gordon Leathers

To hear the lituus:  
[www.tinyurl.com/y9kx2q2](http://www.tinyurl.com/y9kx2q2)

Courtesy ESRPC



# Clean Air and Dirty Laundry

Miscellany

Source: Welcome Trust

Because of a dream she had a few years ago, artist Angela Palmer decided to visit Cape Grim, Tasmania, and Linfen, China. Cape Grim is cleansed by strong coastal winds and has the cleanest air on the planet. Linfen is a coal-producing city and has the dirtiest air.

Palmer collected air and water samples for scientists to study, took photographs, and documented the effects of air pollution on her white outfit after wearing it for a day in each city. Here are the clothes, which she included in a current art exhibit in London, England.

We know coal is bad for the environment, but what's good? Find out with our new column Ask the Green Team [page 26]! ↵

— Jude Isabella



# Planet Pangolin

by Sam Logan



# Small Dino, Nasty Bite

This bird's got bite. Or, rather this dino does. While *Sinornithosaurus* (Chinese-bird-lizard in Latin) is an ancestor of modern birds, a group of American and Chinese scientists were shocked to look at its skull and see similarities to a much different creature — a venomous snake.

The small raptor was a turkey-sized predator that lived in the forests of China during the Cretaceous period, 144 to 65 million years ago. Though it was discovered in 1999, scientists continue to unlock its mysteries.

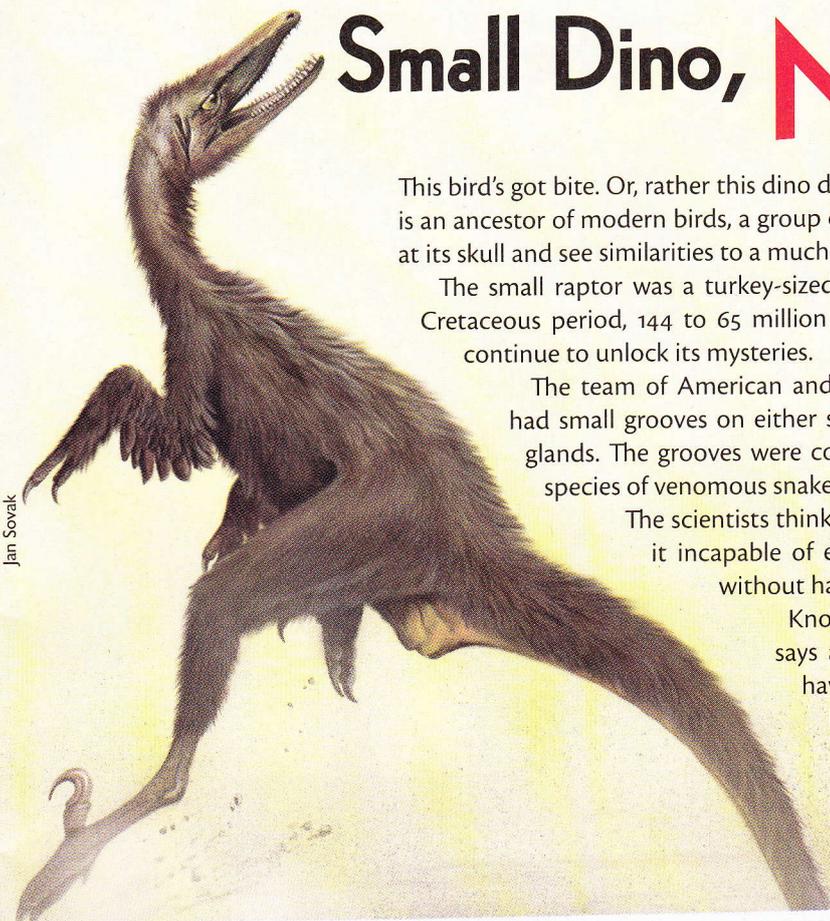
The team of American and Chinese scientists noticed that *Sinornithosaurus's* skull had small grooves on either side of the face. This is where you normally find venom glands. The grooves were connected to a row of sharp front teeth, similar to many species of venomous snakes and lizards that exist today.

The scientists think the venom may have sent the victim into shock, making it incapable of escape. That way, *Sinornithosaurus* could enjoy its meal without having to worry about its prey getting away.

Knowing that *Sinornithosaurus* may have been venomous says a lot about its hunting habits. The small raptor would have used stealth, perhaps hiding in the treetops before leaping upon its prey. Researchers think it preferred feasting upon small birds because of specialized teeth that were probably used for removing feathers — who wants those stuck between their incisors? 🗨️

— Shannon Campbell

Jan Sovak



# Happy and Sad All Over

The old saying might very well be true: when you laugh, the world laughs with you. In a recent study, Disa Sauter, a scientist at the Max Planck Institute of Psycholinguistics in the Netherlands, found that sounds for certain emotions are probably shared by humans around the globe.

Dr. Sauter studies non-verbal communication. She watches and listens to how people tell each other how they're feeling even when they're not actually talking. "If your friend takes a bite out of a cake and looks disgusted, you won't want to try that cake," Dr. Sauter says. "It's something we do all the time without really thinking about it."

Listen to people, and you'll find they make a lot of different sounds: they laugh, they cry, they make sighing noises, they scream. Strong sounds for strong emotions.

"I wanted to see if these kinds of sounds are the same for all human beings, or whether they are different depending on where you grew up," Dr. Sauter says.

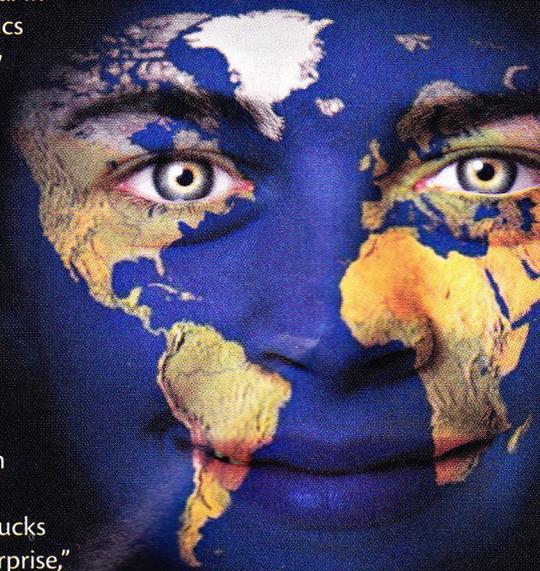
To do this, she tested two different groups of people. One group lived in England. The other group lived in a remote part of Namibia, a small country in southwestern Africa.

"We found that people in England and Namibia all recognized growls of anger, yucks of disgust, screams of fear, laughs of joy, crying for sadness, and a short breath for surprise," she says. "This means that these emotions are shared with all humans."

This wasn't true of all the sounds they tested. Some sounds are unique to small groups of people, which could mean that many sounds are learned from the people around us. Ha! 🗨️

— Gordon Leathers

Duncan Walker



# Grunting Tennis Players

When pro tennis player Maria Sharapova hits the ball, she reportedly grunts at 100 decibels. While that's ear-shattering — sustained sounds above 85 decibels can damage human ears — what worries everyone is not Sharapova's hearing but whether she's cheating.

Sharapova is one of many grunting tennis players. Some non-grunters and fans are annoyed because they say loud grunts can distract and possibly mask the sound of the ball hitting the racquet, a clue to where a ball might travel. One study has come out on the non-grunters' side.

Researchers at the University of Hawaii and University of British Columbia recruited 33 students to sit in front of a computer and watch 384 videos of a pro tennis player hitting balls, forehand or backhand, to either the left or right of a tennis court. Half the videos included a grunt, half did not. The participants' task was to judge the ball's direction — was it going to the left or right of the screen? A computer program recorded their responses.

Researchers then judged the participants' reaction times. When a tennis player grunted in a video, participants were slower and made more mistakes in predicting a ball's path than when there was no grunt. So what happens now — gags for the grunters?   
— Jude Isabella



Maria Sharapova

Chris Young/CPimages.ca

## Space Exploration

# Mirror, Mirror, on the Moon

A lost lunar rover is found, and a scientist reflects on it — with lasers.

Tom Murphy, a University of California scientist, studies how gravity works by watching the Moon's orbit around Earth. Dr. Murphy takes precise measurements — down to the millimeter — on how far the Moon is from the Earth at any given time. Dr. Murphy gets his measurements by shooting laser beams at special reflectors on the Moon and measuring how long it takes for light to get to the reflector and come back.

There are five reflectors on the Moon. Three of them were placed by the American *Apollo* astronauts about 40 years ago. Two others, *Lunokhod 1* and *Lunokhod 2*, are carried by lunar rovers put there by the Russians around the same time. One of the Russian rovers, *Lunokhod 1*, operated on the Moon's surface for about a year before it wandered away and got lost.

"It was landed November 1970 at the height of the space race," Dr. Murphy says. "It carried a laser reflector that we hadn't seen since 1971, and we wanted to find it so we could use this reflector in our project to test gravity."

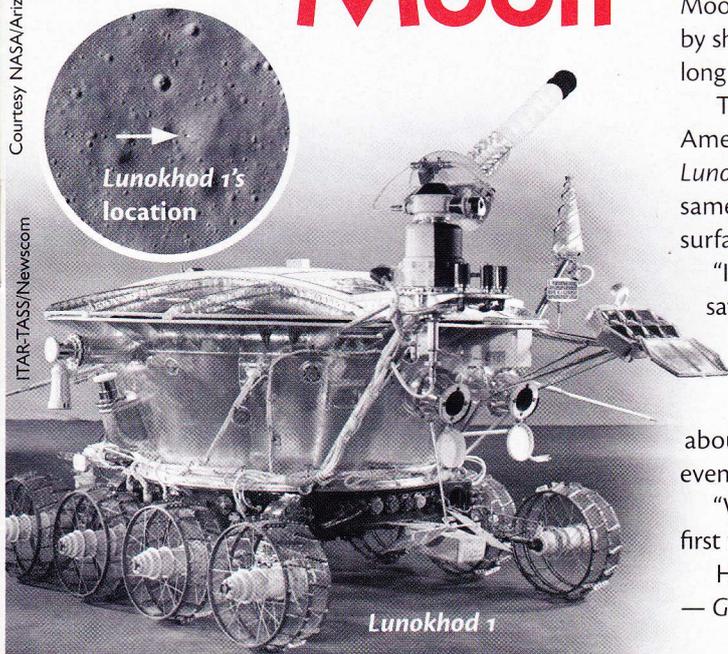
A camera that NASA has orbiting the Moon to scout future landing sites recently spotted *Lunokhod 1*. NASA scientists told Dr. Murphy about finding *Lunokhod 1*, and he started firing the lasers. The results were even better than he expected.

"When we first saw it, it was as bright as the *Apollo* reflectors, and our very first measurement returned more light than we ever got from *Lunokhod 2*."

Hmmm, many reflectors make "light" work.   
— Gordon Leathers

Courtesy NASA/Arizona State University

ITAR-TASS/Newscom



Lunokhod 1

# Robo Picker

Ron Hohenhaus

Strawberry pickers beware: you may be out of a job one day. But surely only a human can find the berries, pick the reddest and juiciest ones, put them in a basket, and, if no one's looking, eat them on the spot.

Researchers in Japan have programmed a robot to do the job — except for the part about eating the strawberries on the spot when no one is looking.

"The robot has two cameras so it can see the 3-D position of the strawberries," says Shigehiko Hayashi, an engineer at the Japanese Institute of Agricultural Machinery. "At the same time it measures the color to see how ripe the strawberries are." Hayashi and his team won a prize at the fourth annual Robot Awards held at the Japanese National Museum of Emerging Science and Innovation.

Their robot knows green strawberries aren't ready but red ones are. If the berry is 80 percent red, the robot slides out a little pincher. It grabs the stem and snips off the berry then it takes it, drops it in a basket, and looks for another one.

The robot picks strawberries almost twice as fast as you can — and it doesn't need to stop for breaks. While the engineers work on other robotic pickers — for tomatoes, for example — what's really needed is the fearless robot that can handle blackberry bushes. 

— Gordon Leathers



Stephen Kirklys

Courtesy Romobility Youto (2)



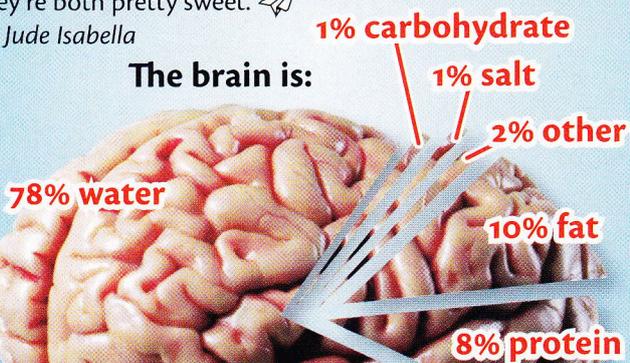
# The Brain by the Numbers

As an infant, your brain weighed between 350 and 400 grams — about the same as seven Mars bars (52 gram size).

As you grew, so did your brain — to a whopping 1300 to 1400 grams, over 26 Mars bars. Instead of chocolate, however, the main ingredient of the brain is plain old water.

But the next most abundant ingredient in the brain is fat, only slightly less than the percentage in a Mars bar. The brain is 10 percent fat while the Mars bar is 14 percent. And they're both pretty sweet. 

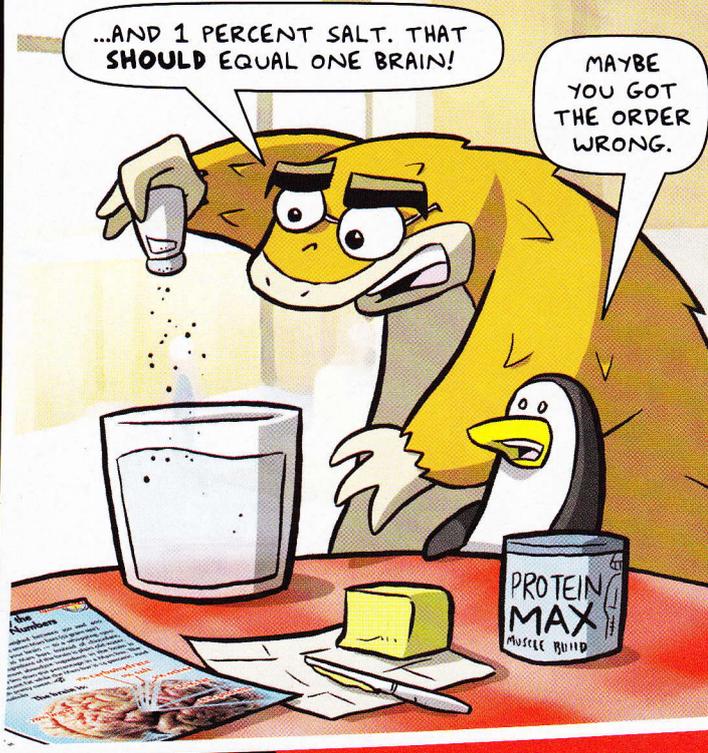
— Jude Isabella



For the sake of science, the editors bought a 52 gram Mars bar, checked the nutritional information on the packaging, and then ate the product inside. What a sacrifice.

# Planet Pangolin

by Sam Logan



# Dinner, With a Side of Music

Valentyn Volkov

It turns out that music has a lot to do with how you feel about your dining experience.

Fine restaurants want their customers to have a great time, stay longer, and spend more money," says Dr. Robert Novak, a scientist from Purdue University. "They also want you to tell your friends about how great their restaurant is."

Dr. Novak studies sound, and his son Christopher studies the hospitality industry and works for a major hotel chain. Together, they did an experiment with restaurant diners. It turns out that if there's no music, diners can hear other conversations, and they didn't seem to like that. But the right music, played at the right volume, helps diners feel like they're the only people there.

"Our diners were college-age students and they liked classical music, such as Mozart or Bach," Dr. Novak said. "It was quiet enough that they could talk with their friends without raising their voices, but loud enough that they didn't have to listen to other people in the restaurant."

They also discovered that women like it quieter than men do. Restaurants that depend on women should pick quieter music, played at a lower volume.

"Restaurant owners should think about having a really good sound system," Dr. Novak said. "They also might want to have a sound level meter to make sure the volume is right for the people who like to eat there." 

— Gord Leathers



quavondo

# Counting Calories

You can get more than you bargained for when you eat a fast food meal. Along with your burger or fried chicken you usually get a whole lot of calories. Take a look at the calorie count in some fast food burger meals. (The figures include fries and a Coke.) Keep in mind, an active 10 or 11 year old only needs about 2200 calories a day. 

— Matt J. Simmons

**Burger King Whopper**

**1540**

**McDonald's Big Mac**

**1390**

**Wendy's Big Bacon Classic**

**1160**

(Turn to page 14 for more about calories.)

# Planet Pangolin

by Sam Logan

