Science in the News

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April 2015

The Science of Popcorn

Sure, popcorn tastes great. But it's also the subject of some serious scientific study.

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What's Inside:

What Happens When Popcorn Pops?

Physical Science

Studying popcorn might make everyone in the lab hungry, but two French scientists are more interested in how popcorn moves than how it tastes. The scientists study *mechanics*—the science of force and motion. What temperature is needed for a kernel to pop? Why does it make a popping sound? Is there a pattern to the way a kernel jumps when it pops? These are some of the questions the scientists wanted to answer.

To start, they placed individual kernels of popcorn on a pan inside an oven and used high-speed cameras to film what happens when the kernels pop. Temperature was key. They found that no matter what kind of corn it was, the kernels popped at the same temperature: 180°C (356°F).

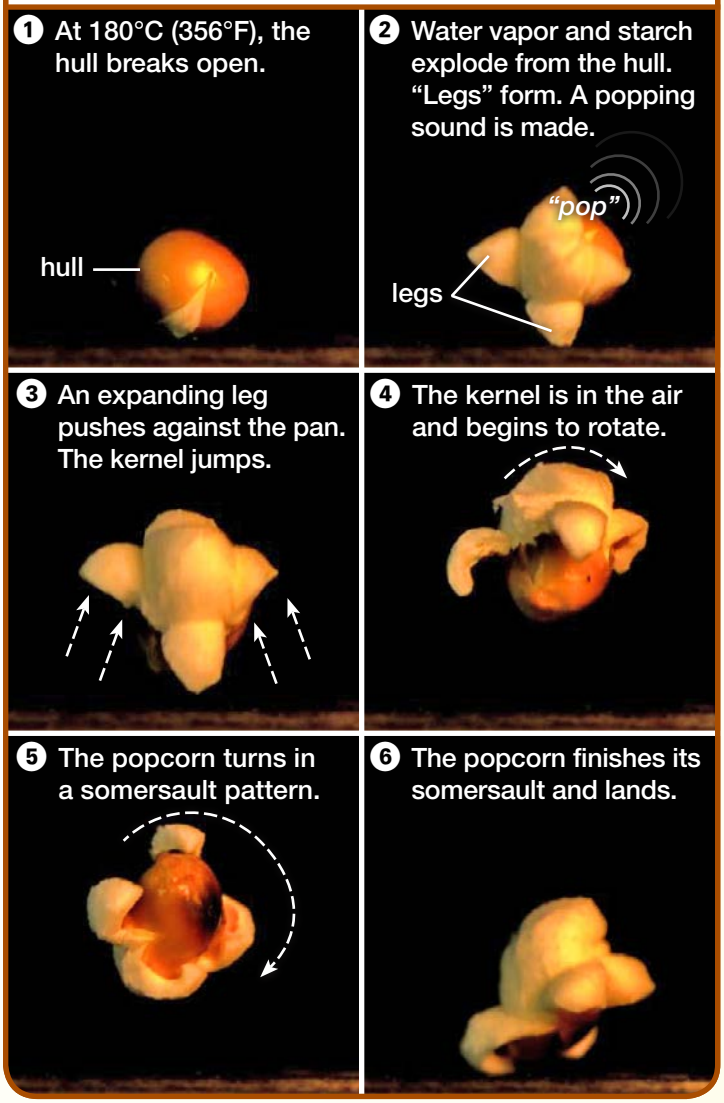
The popping sound occurs when water vapor blasts out of a kernel. Moisture inside the kernel heats up as the oven temperature rises, turning the starchy insides of the seed to mush. When the temperature hits 180°C, the *hull,* or outside of the kernel, can't hold the steam inside any longer and—*pop!* The mushy insides of the kernel explode.

The mushy starches shoot out quickly once they are free of the hull. The starches instantly cool off and form what the scientists call "legs." These are the soft parts you eat. When one leg quickly pushes off against the surface of the pan, it sends the popcorn spiraling into the air. It jumps in a motion similar to a person doing a somersault. All of this happens in just a fraction of a second.

The movement of a popping kernel of corn is a bit like a person doing a somersault.

HOW A KERNEL POPS

High-speed cameras help us understand how a kernel of popcorn pops.



The scientists analyzed their film carefully and recorded measurements for temperature, the sound waves made during the pop, and angles of rotation when the kernel jumped. After filming about four hundred pieces of popping corn, they found that each kernel repeats this same pattern when it pops and makes the fluffy treat that we like to eat at the movies. In fact, there may be more action happening inside your popcorn than on the big screen! ❖

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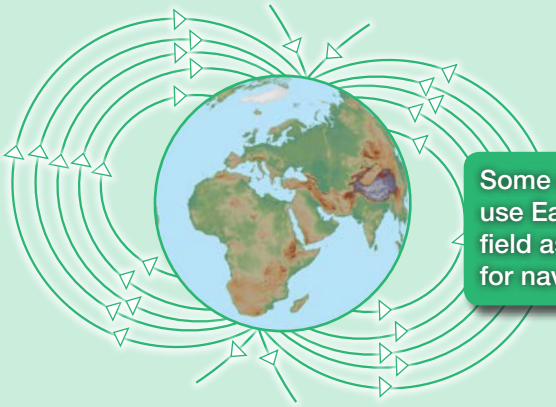
Home Sweet Magnetic Home



Some animals can use Earth's magnetic field as a compass for navigation.

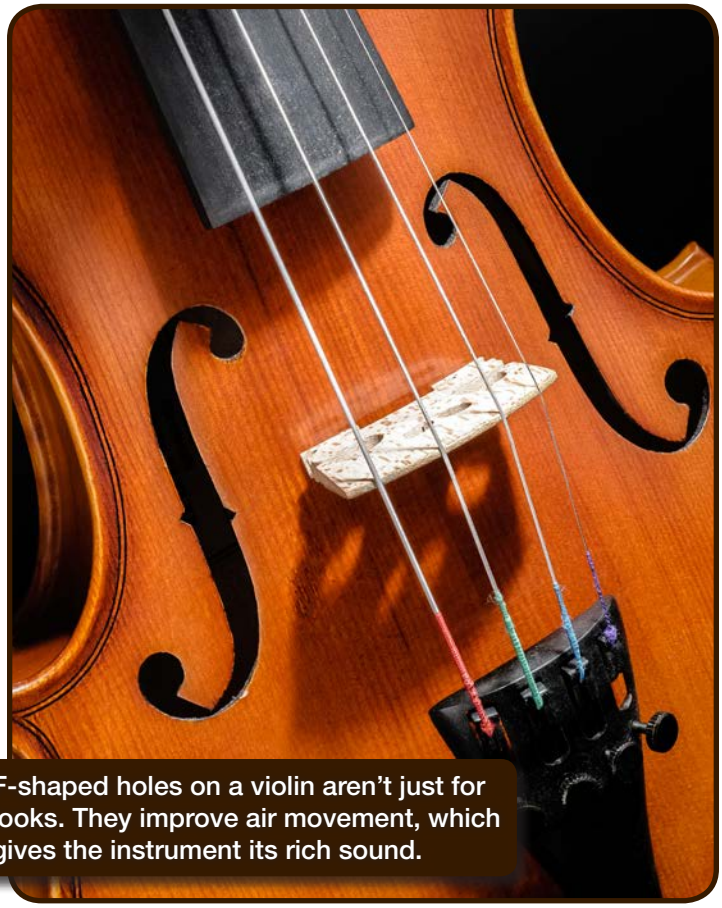
Earth Science

Just after hatching, loggerhead sea turtles scramble down the beach and plunge into the ocean. Then they roam the ocean, swimming thousands of miles. Years later when they are ready to mate, they return to the same beach where they hatched. How can they find their home after roaming the ocean for so long?

Some animals, including loggerheads, can detect Earth's *magnetic field.* Earth is similar to a giant magnet with invisible lines of force that travel from the South Pole to the North Pole. Two marine scientists from North Carolina suspected that the young turtles could memorize the magnetic field of their hatching beach and later use the information to get home. But over time, Earth's magnetic field moves slightly. Would the turtles shift their nesting spots to match the change in Earth's magnetic field?

Luckily, volunteers had recorded nesting sites along Florida's coast for nearly twenty years. The scientists studied the nest locations. Sure enough, the nests moved slightly each year to match the changing magnetic field. Now that's an *attractive* beach! ❖

A loggerhead turtle digs a nest on its home beach.



F-shaped holes on a violin aren't just for looks. They improve air movement, which gives the instrument its rich sound.

F-Shaped Holes Make a Better Violin

Physical Science

Violins have two thin, curved holes that look like the letter "f." The holes allow air to flow out from inside the instrument to produce a rich sound when the strings are played. Older string instruments, such as *lutes,* have round or c-shaped holes. These instruments do not produce tones as loud as violins with f-shaped holes.

Scientists from Massachusetts who study sound and airflow wanted to know why the hole shape matters, so they examined violins from the seventeenth and eighteenth centuries. Musicians consider violins made at that time to be the best in the world. The scientists also studied even older string instruments. They found that the narrow, f-shaped holes cause the air to speed up as it escapes the body of the violin. The faster-moving air makes for louder, more powerful sounds, especially for lower-pitched tones. So when it comes to grading violins, an "f" is a good thing! ❖

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Say "Ow!" and Feel Better

Life Science

When you fall and skin your knee or touch a hot pan, what do you say? "Ow!" of course. It's natural to screech in pain when you hurt yourself. Now it seems that there's a scientific reason.

Scientists in Singapore found that saying "Ow!" helped people tolerate pain better. To test this, they asked people to put their hands in painfully cold water and keep them submerged as long as possible. The scientists asked some to say "Ow!" or to press a button when their hands hurt. They asked others to remain silent and do nothing or to listen to a recording of someone saying "Ow!"

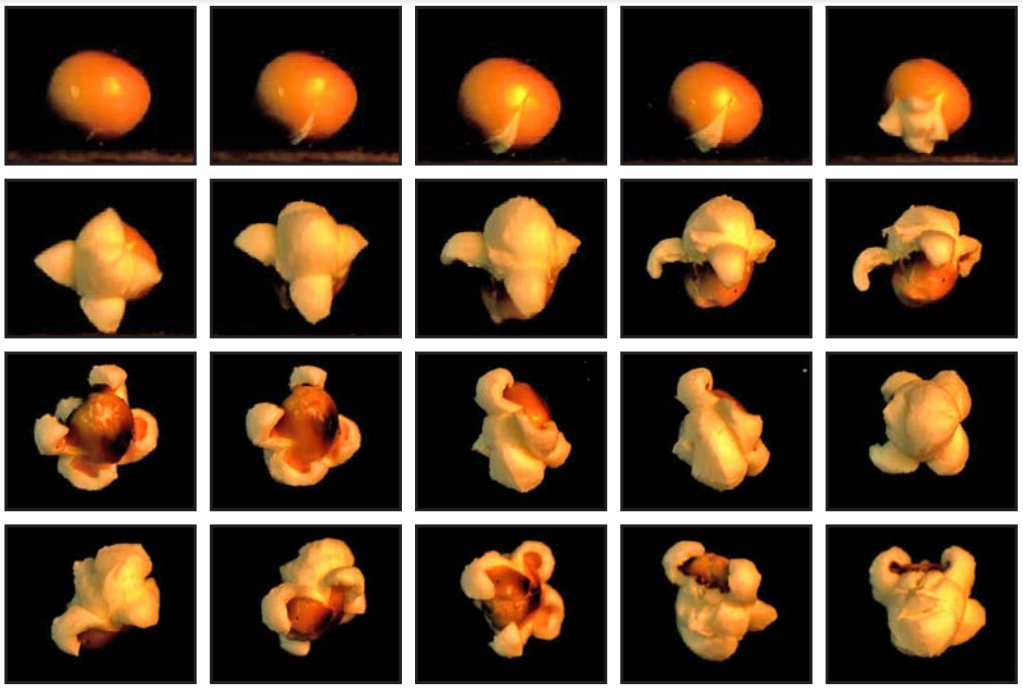
Those who expressed their discomfort by saying "Ow!" or pressing a button were able to keep their hands in the icy water longer than those who said and did nothing. Listening to someone else say "Ow!" didn't help, either. The scientists think that actively doing something during a painful experience may disrupt our brain's awareness of the pain and make it easier to handle. ❖

Saying "Ow!" helps you put up with pain.

STEAM Activity

Popcorn Flipbook

Make a mini movie of a popcorn kernel popping in a flipbook. All you need is a pencil and a pad of sticky notes or a stack of index cards. Use these images as your guide or visit Science A-Z to view a slow-motion video of popping corn. Draw a single picture of a piece of popcorn on each sticky note, starting with a kernel and then changing it bit by bit until the kernel pops, does a somersault, and lands. The more individual pictures you draw, the better the "movie." After completing all your drawings, hold the top of the note pad in one hand and quickly flip the pages with your other hand to see the popping action.



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