



MAGNETISM Mirth & Moans



LEGENDARY LIGHTS

In Finland long ago, people thought that foxes with bright, sparkling fur were running and playing in the mountains of Lapland, an area that is north of

Circle. Since they attributed the colorful Northern Lights to these playful foxes, the Finns called aurora activity “fox fires.”

The Athabaskan people of Alaska believed that the spirits of tribal members who had died watched protectively over those still living. They saw the Aurora Borealis as evidence of these “sky dwellers” communicating with their loved ones.

Way up north on Saint Lawrence Island in Canada, the Yupik people say that the Northern Lights used to be colorless. Yupik children were warned not to go outside at night or the lights would take them away. But some children didn’t listen, and they were stolen by the lights. So now the lights have colors—the bright parkas of the stolen children dancing across the sky.

Seeing Spots

The Chinese may have been the first to notice dark spots on the Sun more than 2,000 years ago, but it wasn’t until recently that scientists discovered that these sunspots are really magnetic disturbances on the surface of the Sun. Heat traveling from the Sun’s center to its surface is slowed down near sunspots because the spots’ magnetic fields deflect the flow of heat from the Sun’s core. Sunspots appear dark because they are relatively cool areas on the Sun’s red-hot surface.

Word Wise

- ▶ The word “lodestone” comes from the Middle English word “lode,” meaning “to lead.”
- ▶ Aurora (the Roman goddess of dawn), was the name given to the Northern Lights by Pierre Gassendi in 1621. He added “Borealis” to refer to the Roman god of the north wind, whose name is Boreas. Captain James Cook named the Southern Lights the Aurora Australis, or “southern dawn” in 1773, when he was sailing near Antarctica.

Macho Magnet

The Tokamak is a super magnet at MIT’s plasma fusion lab that is so powerful that it could lift a stack of Volkswagens as tall as Mt. Everest—that’s 25,000,000 pounds (11,340,000 kg) of force!

Are you in the loop?

The Sun goes through cycles of about 11 years each when it is “active” and “quiet.” During an active Sun, sunspots multiply, causing solar flares to erupt and send hundreds of millions of tons of solar-wind particles hurtling through space. With this overload of particles in Earth’s atmosphere, auroral ovals can stretch beyond where they’re normally seen. Someone as far south as Mississippi might see the northern lights during a really active sun cycle, while someone in Alaska or Northern Canada, where the lights can normally be seen, won’t be able to, because he or she is inside the auroral oval.

Lobster Metalheads!

Bacteria and Dr. Birdsnoggin's pigeons aren't the only organisms that use magnetism to navigate. Spiny lobsters know which way to go thanks to their internal compass. In late autumn the lobsters move to warmer water in preparation for a chilly winter. Amazingly they reach their destination through the dark of night and huge waves every year without fail. How? They've got tiny bits of magnetite—the same material that's in lodestones—in their brains! The lobsters' migration is guided by their detection of Earth's magnetic field.



Mesmerizing Material

Have you ever been mesmerized by something or someone? The word “mesmerize” actually comes from a man named Franz Anton Mesmer, who in the 1700s claimed to be able to heal people by manipulating magnets and using “mesmerism,” or hypnotic powers. Acclaimed by some as a miraculous healer and by others as a fantastic fraud, Mesmer theorized that a very subtle magnetic force flowed between everything. Although his healing powers may have been more fake than fact, he wasn't entirely off base. Everything does have atoms, and atoms have electricity, which produces magnetism. Most of the time, however, the spin of atoms' electrons cancel each other out, so not everything is actually magnetic.

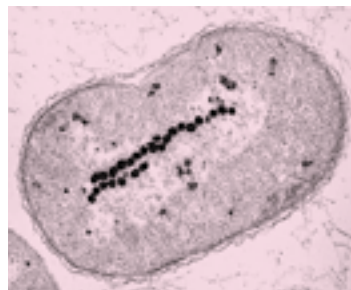
Seeing Red

Jupiter, which has both an atmosphere and a magnetosphere, has auroral ovals over each of its magnetic poles. But since Jupiter's atmosphere is largely made up of hydrogen (unlike Earth's, which is mostly oxygen and nitrogen), dark red is the color produced when solar wind particles collide with atmospheric gases to make the auroras.



Magnetized Bacteria

The bacteria *Aquaspirillum magnetotacticum* has no eyes but still manages to find its way to its food source deep in the muck of salt water marshes. It uses Earth's magnetic field to guide its way. Scientists have discovered that members of this species have a tiny chain of magnetite inside their cell that they use to detect the direction of



Earth's magnetic field. Not only do these bacteria know which direction is north, they can also use magnetic inclination to figure out which way is down—the direction of their food source!

MEDICAL MAGNETISM

From MRIs to surgical “tweezers” that pull magnetic objects out of people's bodies, magnetism is alive and well in the medical profession. There are many people who believe that magnets can also be used therapeutically to help our bodies heal, or at least feel less pain from such ailments as arthritis, chronic back pain, tennis elbow, and knee injuries.

Our blood contains iron. And according to some studies, more blood cells are drawn to a specific

area when magnets are held over it, helping to stimulate blood circulation and accelerate the healing process. Other scientists believe that magnets can alleviate pain in some people because magnetic energy affects chemical interactions in nerve fibers that are responsible for pain impulses. The debate is ongoing about whether or not magnets can help heal you, but there is no evidence that magnets harm you. (Of course, you should keep magnets away from pacemakers, electrical implants, and any other medical device that could be affected by magnetic force.)