

It's a Twister!

When a big thunderstorm spins off a tornado, the results can be deadly

AMERICANS LOVE TO SPIN YARNS, AND when it comes to the weather, some of the best examples of hyperbole involve tornadoes. We've all heard the stories. One twister drove a piece of straw deep inside a thick fence post. Another picked up a woman cowering in her bathtub, carried her and the tub outside, across the yard and right into the woods. Then there's the story about the Kansas farm girl who was picked up by a big twister and carried to a magical land somewhere over the rainbow. Perhaps you're familiar with that one.

Meteorologists love to swap these stories almost as much as they enjoy debunking them. Take the one about tornadoes driving bits of straw through fence posts. What may actually happen, scientists suggest, is that a sudden drop in air pressure forces the wood to expand, allowing pieces of straw to lodge in newly opened tracks. Trouble is, not all the stories are exaggerated. Betty Lou Pearce, then 64, a clerk from Pilot, N.C., was the recipient of that unexpected bathtub sleigh ride in 1996; she returned from her journey bruised but otherwise unharmed.

Across the broad swath of the American heartland known as Tornado Alley, no sight is more feared than a funnel-shaped cloud, no sound less welcome than the wail of a tornado-warning siren piercing the unearthly, portentous calm that often precedes a big twister. Small wonder, with winds that can reach as high as 250 mph, tornadoes are serial killers, striking again and again in Oklahoma, Kansas and Missouri and, less frequently, elsewhere in the nation. The deadliest tornado of 2010 rampaged through Yazoo City, Miss., on April 24, killing 40 people.

MULVANE, KANS. — A
tornado drops from the sky
to threaten a bucolic country
estate on June 12, 2007.



in the region. On June 5, seven people died when a twister struck Milbury, Ohio, southeast of Toledo. All told, 45 Americans died in tornadoes in 2010. On average, according to the National Oceanic and Atmospheric Administration, 1,000 tornadoes are reported in the U.S. each year, claiming 80 lives and injuring 1,500 people.

What turns a common thunderstorm into a twister? Tornadoes are most often formed by supercell storms, towering cloud structures that can top out at 65,000 ft. and concentrate energy in dangerous ways. A supercell typically takes shape in spring, as warm, moist air from the Gulf of Mexico flows north and pushes through colder, dryer layers of air. As it rises, this upwelling of warm air begins to cool off a bit, and the moisture it contains condenses, first into cloud droplets and then into rain. At that point, the air—now denser because it is colder—starts to sink. But at the same time, the process of condensation that created the rain releases so much latent heat that the air around it warms up once again and retains its lift.

The collision between warm and cold air masses sets up conditions that favor the growth of big thunderstorms. A tornado, however, requires something more: the presence of wind shear, which occurs when winds in the so-called boundary layer—the part of the atmosphere closest to the earth—blow more gently than winds at higher elevations. These two wind streams push on the layer of air that lies between them as though it were an invisible rolling pin. Then, as the warm updraft of a supercell shoots toward the stratosphere, it tilts the rolling pin so that it spins on its end. Soon the entire updraft is spinning, giving birth to a mesocyclone, a rotating column of air as wide as 6 miles. Mesocyclones are the cloud structures from which tightly coiled tornadoes seem to drop; scientists are trying to find out how one turns into the other.

The simplest explanation is that tornadoes form when a smaller, even more rapidly rotating updraft descends from the mesocyclone like a vacuum cleaner nozzle. To our eyes, that is exactly what appears to be happening. But while scientists agree that the updraft is essential,



MIAMI, 1997 Hurricane-savvy Floridians were startled when a tornado dropped in on May 12; no serious injuries were reported

ARTHUR HARVEY—MIAMI HERALD—GETTY IMAGES



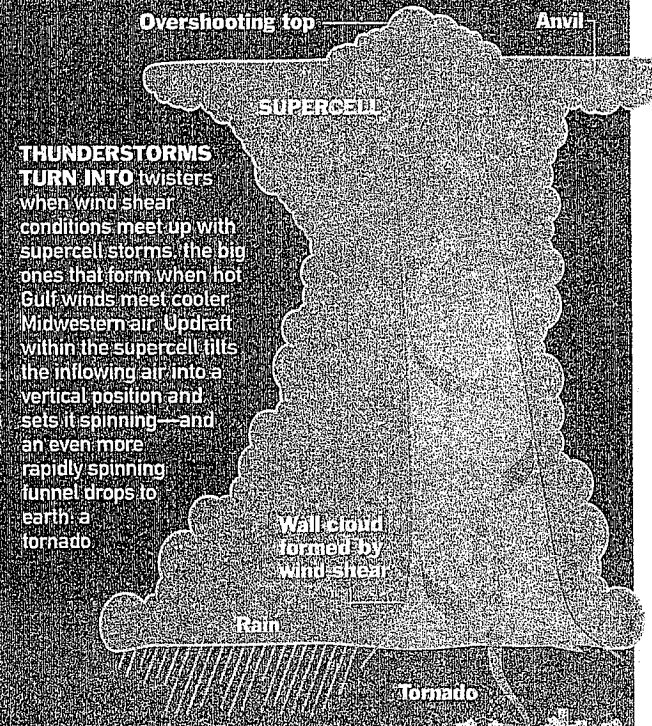
OKLAHOMA CITY, 2003 This factory was leveled by a tornado on May 9; the storm's path of destruction stretched for 35 miles

many doubt that it provides the sole mechanism for tornado formation. Some think the rapid sinking of colder, dryer air near the rear of the storm may be key. Another possibility: tornadoes may be similar to waterspouts and dust devils, which build their vortices not from the clouds down but from the ground up. It's possible that tornadoes form both ways, top-down and bottom-up.

As with hurricanes, scientists can't control tornadoes; the goal is to predict their appearance and trajectory more accurately. The biggest advance in recent decades is Doppler radar, which takes advantage of radio waves that shift frequency depending on whether the rain droplets they bounce off of are advancing or receding. As the winds inside storm clouds begin to spin, the droplets show up on radar screens as tighter swirls, aiding advance detection of tornado formation—and saving lives.

Collaboration between radar developers and storm chasers led to the Next-Generation Radar system, which the National Weather Service installed nationwide by 1997. The new system has extended the lead time for tornado warnings from 3 to 11 min., on average, saving more lives. If meteorologists keep at it, we soon may know everything there is to know about tornadoes. But that won't stop the unlikely stories from getting spun, and it won't stop the pleasure we get in swapping them. ■

TORNADOES 101



THUNDERSTORMS TURN INTO twisters when wind shear conditions meet up with supercell storms, the big ones that form when hot Gulf winds meet cooler Midwestern air. Updraft within the supercell tilts the inflowing air into a vertical position and sets it spinning—and an even more rapidly spinning funnel drops to earth: a tornado.

The pressure inside a tornado is much lower than the pressure outside it, creating a vortex that "inhales" anything it encounters.