

Can it really rain fish and frogs?

A laboratory experiment from the
Little Shop of Physics at
Colorado State University



Overview

Many people have heard the expression “It’s raining cats and dogs” to describe a deluge of rain. Although the origin of this saying is unclear and no one has actually seen this happen, many other surprising items have been documented falling from the sky! It can’t rain cats and dogs, but it can rain fish and frogs—though some extreme weather is involved! The culprit is a *waterspout*. Intrigue your students with the following air pressure demo as an introduction into a unit exploring waterspouts and other extreme weather.



Placement of the leaf blower at a 90° angle, half above and half below the tube is crucial.

Necessary materials:

- 1 electric leaf blower
- 1 extension cord
- 1 clear cylinder or pvc pipe
- 1 container of Goldfish crackers (may substitute styrofoam packing peanuts)

You will need to practice this activity before your presentation to ensure that the pipe or cylinder is the correct length and diameter for your particular leaf blower. You may want to experiment with other items in your container rather than crackers or styrofoam packing peanuts. This demonstration, though messy, will be startling and memorable for your students and well worth the effort.

Theory

Although veiled in mystery, people throughout history and around the world have reported surprising objects falling from the sky. Recently, the BBC news reported fish raining from the skies above the village of Knighton in England. Numerous articles recount not only fish, but frogs, worms, water birds, tomatoes, lumps of coal, and even a sailboat falling from the sky. These events are often a result of a **waterspout**, a tornado-like winds that can occur over bodies of water. The winds over the surface of the water swirl into a vortex and move upward. NOAA scientist Joseph Golden recorded winds in one waterspout that swirled around the vortex at 27 m/s (about 60 mph) which moving upwards at 9 m/s (about 20 mph.), but some waterspouts can involve speeds of up to 85 m/s (nearly 200 mph)!

Wind of this speed can pull things up into the spout from a meter below the water’s surface. Thus, it’s not surpris-

ing that fish, frogs, tomatoes, and even lumps of coal have fallen from the sky. The objects stay up in the sky until rain begins falling from the cloud, cooling the air that was keeping the waterspout going. Objects raining from the sky have been reported up to 100 miles inland. In the United States, waterspouts are most common in the Florida Keys. They have however, been reported along the east and west coasts, at Lake Tahoe, the Great Salt Lake, and the Great Lakes as well.

Doing the Experiment

You should start with some discussion; ask your students to brainstorm about types of severe weather. Conduct a discussion and survey their views about unusual weather phenomenon such as reports of raining fish and frogs. Then, announce that you have an intriguing demonstration that ties in with their discussion and begin.

The demonstration proceeds like so:

- Have a volunteer hold the clear cylinder or pvc pipe upright and just above the container of Goldfish crackers, or 1 to 2 inches above the packing peanuts.
- Instruct your volunteer to move the pipe around the container while you use the leaf blower to blow across the top of the pipe. Place the leaf blower at a 90° angle to the pipe with half of the leaf blower opening above and half below the pipe.
- Turn on the leaf blower and let the excitement begin. Goldfish crackers should start coming up the pipe and fly everywhere before falling to the ground.

Discuss and explain what is happening. In this demonstration, the fast moving air blowing across the top of the pipe creates an area of low pressure; in a waterspout, the low pressure comes from the cyclonic motion of the air around the vortex. In both cases, higher external pressure drives material into the low-pressure region in the tube or the vortex, with dramatic results!

Some items for further discussion or study:

- Discuss waterspouts and their role in raining objects from the sky.
- Have your students collect unusual stories about the weather and research possible explanations for the different phenomena.

Summing Up

Extreme weather and unusual weather-related events can pique your students' curiosity and hook them into studying the weather. There are some surprising elements of extreme weather that this demonstration brings to light. Tornadoes and waterspouts have a low pressure region in the center. We think of such fast-moving winds as having high pressure, but this fast speeds actually generate a low-pressure area, as with the leaf blower.

For More Information

CMMAP, the Center for Multi-Scale Modeling of Atmospheric Processes: <http://cmmmap.colostate.edu>

Little Shop of Physics: <http://littleshop.physics.colostate.edu>