

## Frogs, Turtles Freeze Solid in Winter, Come Back to Life in Spring

<http://www.icue.com/portal/site/iCue/chapter?cuecard=40157>



### General Information

<b>Source:</b>	NBC Today Show	<b>Resource Type:</b>	Video News Report
<b>Creator:</b>	Jane Pauley/Robert Bazell	<b>Copyright:</b>	© NBC Universal, Inc.
<b>Event Date:</b>	11/29/1988	<b>Copyright Date:</b>	1988
<b>Air/Publish Date:</b>	11/29/1988	<b>Clip Length</b>	00:03:58

### Description

In 1988, researchers discover that turtles and frogs freeze solid in winter, producing a natural antifreeze -- glucose sugar -- that protects their organs until they thaw in warmer temperatures.

### Keywords

Frogs, Wood Frog, Turtles, Freeze, Hard Freeze, Frozen Solid, Cold Temperature, Survive, Winter, Hibernation, Protectant, Manufacture, Antifreeze, Natural, Glucose, Sugar, Glucose Sugar, Chemical, Energy, Cell, Protect, Organ, Brain, Liver, Heart, Blood, Concentration, Defrost, Revive, Hatchling, Higher Animals, Vertebrate, Backbone, Human Organs, Organ Transplant, Research, Carlton, Ottawa, Canada, Application, Human Health, Medicine, Amphibians, Biology

### Transcript

Frogs, Turtles Freeze Solid in Winter, Come Back to Life in Spring

JANE PAULEY, anchor:

On Today's Discovery science correspondent Robert Bazell tells us about some creatures that can freeze but not freeze to death. Just freeze and then come back to life. Good Morning.

ROBERT BAZELL, reporting:

Good Morning, who says we don't cover the world. Until very recently, scientists had thought that higher animals like us were not capable of surviving a hard freeze, as frozen as the vegetables in your freezer. But recently they discovered that some frogs and turtles can freeze, and this has opened up a fascinating new line of research. Janet and Ken Story are out looking for places where frogs and turtles spend the winter.

JANET STORY (Scientist): Oh look, a wood frog.

BAZELL: What is unusual about these animals is that they don't simply hibernate.

KEN STORY (Scientist): In this niche, in this ecological niche a lot of animals just dig down a little bit, bury themselves in the wet dirt and spend the winter frozen solid.

JANET STORY: See if we got any live hatchlings here.

KEN STORY: There should be.

BAZELL: Until just a few years ago scientists did not realize that any vertebrates, animals with backbones, were capable of surviving after freezing. But they now know that some frogs and turtles do it every year. The Story's study this phenomenon in this laboratory at Carlton University in Ottawa.

KEN STORY: To take an animal, a vertebrate to higher form of life with a brain, a heart, a liver, freeze it solid and then watch it come back to life, it's tremendously interesting to us, what are the mechanisms, how does it do it, how is it controlled?

BAZELL: As part of their experiments, the scientists freeze frogs and turtles. They attach some measuring instruments to them and simply put them in the deep freeze.

JANET STORY: This is a natural temperature that the wood frog would see out of doors.

BAZELL: Hours, days or weeks later, they take them out and defrost them. When the animal is frozen, all of the blood is concentrated around the heart which doesn't beat. In fact neither the brain nor any organ in the body functions.

KEN STORY: They're now hard and crunchy and make a sound when you drop them.

JANET STORY: Their eyes are sort of glazed over, the limbs are very hard, you can barely move them. He's very icy, he feels like a little frog popsicle actually. These animals have been in, been frozen for maybe twelve or fifteen hours now, and they should be near their maximal ice content.

BAZELL: Once out of the freezer the frog defrosts and in a few minutes comes back to life, returns to normal.

KEN STORY: The limbs are the first to thaw with ice leaving the skin, the skin's now soft and subtle, whereas before it was solid as a rock. The animal isn't injured at all, you can feel his heart has begun to beat again and he's begun to get active.

BAZELL: The Story's have found that the frogs and turtles manage to survive by manufacturing an anti-freeze, glucose sugar. They produce large amounts of it, and that protects the cells in the body. The researchers are trying to find out exactly how this system works. They measure the amounts of energy going in and out of the frog as it freezes and unfreezes. They also analyze the chemistry of the glucose anti-freeze process. The hope is that the findings could someday prove useful in medicine.

KEN STORY: In the bigger picture we're of course trying to discover the mechanisms in order to apply them to even higher forms of life. Does the frog and the turtle in the way they freeze, in the protectants

they put out, in the way they can survive ice tell us something about how we can take a human organ, freeze it solid, keep it for some period of time, thaw it and have it survive as well.

BAZELL: But even if such applications are never found, the sight of a frozen animal coming back to life will remain fascinating. This is truly interesting to me, that no vertebrate had ever been known to do this before, they suddenly discover that these things could come back to life after being essentially dead for months or even years.

PAULEY: Science is catching up with Hollywood, I think Hollywood has known for years.

BAZELL: Yea Hollywood knew it for, well Hollywood's done a lot of things for years, but I think that this is a lot better, and also the possibility of freezing transplanted organs, that's an interesting idea.

## Related Cue Cards

Turtles Can Hold Breath Underwater For Months -- Yet Keep Brain Function

<http://www.icue.com/portal/site/iCue/chapter/?cuecard=40034>

Turtles are studied in 1983 to see how they retain brain function without taking in oxygen while underwater for days or months; research may someday help prevent brain damage in oxygen-deprived humans.



Strike One: How Rattlesnakes Hunt [Caution: Graphic Video]

<http://www.icue.com/portal/site/iCue/chapter/?cuecard=40175>

Researchers in 1982 study the hunting and feeding habits of the timber rattlesnake and a cobra, using live mice dropped into snake cages. (Note: report shows scenes of snake strikes and a snake eating a mouse.)



The Blood Runs Cold? T-Rex's Didn't

<http://www.icue.com/portal/site/iCue/chapter/?cuecard=40154>

Scientists studying fossils of a Tyrannosaurus Rex find evidence that the infamous dinosaur was warm-blooded -- like a giant predatory bird -- not a slow-moving cold-blooded reptile.



Egg Hunt in the Everglades: Collecting Alligator Eggs

<http://www.icue.com/portal/site/iCue/chapter/?cuecard=39756>

Alligator farming is a \$16 million business in Florida, but alligators do not breed well in captivity, so gator eggs are collected in the Everglades. Farmers pay \$5 for an egg, and sell the grown alligator for \$250.

