Amazing frozen frogs

Right now, in shallow pools and wet woodlands in Adams County, wood frogs (Rana sylvatica) can be heard croaking in chimneys for mates. They are the earliest frogs to appear in the spring, often before the ice is off the water. Besides living in Adams County, wood frogs can also be found in eastern North America all the way up to the Arctic Circle. Wood frogs even call from arctic tundra pools.

How can these wood frogs survive freezing winters?

Dr. John Costanzo, a professor from Miami University, Ohio, and a researcher in Miami's Laboratory for Ecophysiological Cryobiology (cryo means low temperature), has been studying wood frogs in Adams County for the past 10 years. He's fascinated with how these amphibians survive the winter just below the leaf litter in a shallow depression which they have dug.

According to Dr. Costanzo, "in order to survive the coldest of winter temperatures, wood frogs freeze solid. Their heartbeat stops and all bodily functions cease. They can remain in this state for a few days to a month." In other words, the wood frogs could be considered dead. But are they? Once spring arrives, the frog's heartbeat will spontaneously start again. The frog will unfreeze and become fully functional within 14 to 24 hours and be ready to mate immediately.

How do these frogs do it? Dr. Costanzo says, "the process starts when ice touches the frog's skin in winter. This immediately sets off signals inside the frog's body to pull excess water away from the organs and cells. The remaining water then freezes. The problem with freezing is that ice crystals and concentrated salts can damage cells. The frog uses a cryoprotectant (antifreeze) made of glucose."