

## Is there life in ice?

All life on Earth requires water, so how could any life possibly live in or around frozen ice or snow? If a person, a dog, a bird or many other types of life were frozen into ice, they would die, but there are some creatures that have special tricks for living with ice. The ice cubes in your freezer are not full of life, but the ice and snow fields that are around all year long are homes to many kinds of microscopic living things (microbes).

Some of these microbes go dormant (they slow down as if in a deep sleep) when frozen and then become active again when they are defrosted. For example, snow algae lives on snow and glaciers in very cold places. It becomes buried in snow and dormant during the winter. But in spring and summer when light increases and the snow begins to melt a bit, it travels to the surface of the snow and turns it red.

It is much easier for something to stay alive if it doesn't get frozen. Some creatures have chemicals in their cells that keep them from freezing — just like antifreeze is used in cars to keep them running in the winter. Other creatures live in water that is harder to freeze. Water usually freezes at 32°F or 0°C, but

adding salt or other substances to water can lower its freezing point. The saltier the water is, the colder it has to be to freeze. That's why salt is often put on streets in the winter to melt the ice. For seawater to freeze it has to be about 28°F or -2°C.

There is another trick that some forms of life use to live in ice. Look at some of the ice cubes in your freezer. Are they completely solid? If you look closely, you'll notice that they have bubbles and cracks in them. Most ice has little pockets of water between ice crystals that microbes can use to keep from getting fully frozen. You can think of these as mini-habitats for microbial life in what would otherwise appear to be an inhospitable environment.

It is incredible how much life exists in and around ice and at such cold temperatures. Scientists at MSU are examining whether frigid places like Antarctica are a model for what life may be like on icy worlds in our solar system such as Mars, Europa, and Enceladus. Mars has polar ice and ice under its surface. Jupiter's moon Europa and Saturn's moon Enceladus have icy crusts that appear to cover large oceans.

### Did-you-know?

More than 70% of Earth's water is ice! If this ice melted, the Statue of Liberty would be more than waist deep in water because the oceans would rise more than 200 feet.



### Try this!

Take a fresh piece of lettuce, put it in a container and let it sit in the freezer for one day. When you take it out the next day, let it warm up to room temperature. What happened to it?

Living things are made up of cells and all cells have water in them. In fact, humans are made up of approximately 60 percent water. When cells freeze, the water in them can rupture or break open the cells, which destroys them. Therefore, things that live in frigid temperatures usually have to come up with a strategy to keep from freezing.

You can also try taking two ice cubes and placing each in its own sealable plastic bag. Sprinkle rock salt on one but not the other. Seal the bags and watch them for a few minutes. What happens? The ice with the salt should start to melt faster.

Learn about opportunities to participate in upcoming science activities and events at MSU by visiting [Montana.edu/outreach](http://Montana.edu/outreach)