

Nature Week at Heritage Village - August 2nd

Drought

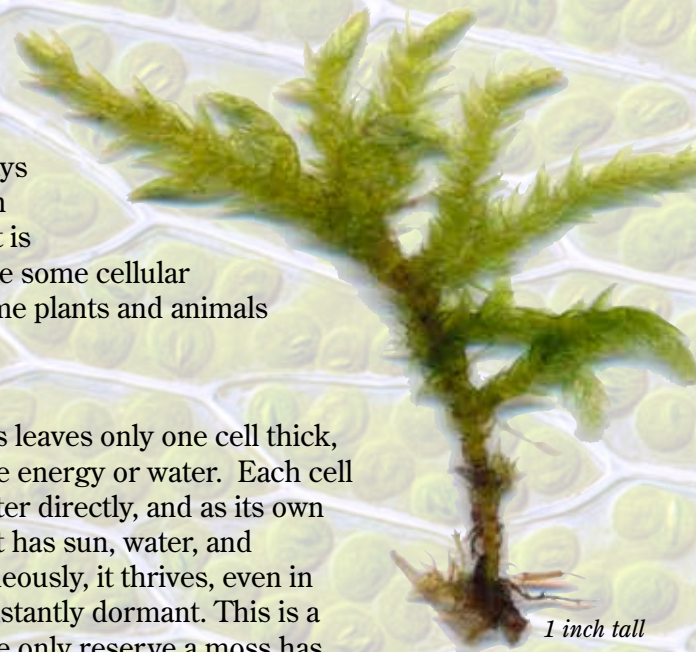
“When a typical cell dries out its membranes rupture and leak, and its proteins unfold and aggregate together, making them useless,” says extremophile researcher Thomas Boothby of the University of North Carolina in Chapel Hill. “DNA will also start to fragment the longer it is dry.” Drought kills plants and animals. Rehydration does too because some cellular components expand faster than others causing cell ruptures. But some plants and animals are more tolerant than others.



Moss has recently been revived after being frozen in a glacier for 1,500 years

Moss

Moss is a very simple plant. It has leaves only one cell thick, no stems, no roots, no way to store energy or water. Each cell acts as its own root, absorbing water directly, and as its own leaf photosynthesizing energy. If it has sun, water, and temperatures above 20°F simultaneously, it thrives, even in winter. Without all three it goes instantly dormant. This is a plant that lives in the moment. The only reserve a moss has is a protein that allows it to repair cell damage from drought and from rehydration. Add water to a dried moss and it rebounds in seconds. The stored protein repairs any damage, and photosynthesis begins again. Almost all other plants, from trees to weeds, have food reserves, can take up water at night, and have a cuticle or waxy coating on their leaves to hold in moisture. Moss has none of these. Because it can survive extreme drought and because the plant grows continually at its tip, it is sometimes called the eternal plant.



1 inch tall



Mossery - a Victorian craze for collecting moss

Tardigrade – the most extreme animal at Heritage Village



In drought they dry into a tiny ball of dust until rehydrated. They then begin to swim again in 20 minutes. A tardigrade walking on moss by Nicole Ottawa & Oliver Meckes / Eye of Science

“Is this an alien? Probably not, but of all the animals on Earth, the tardigrade might be the best candidate. That’s because tardigrades are known to be able to go for decades without food or water, to survive temperatures from near absolute zero to well above the boiling point of water, to survive pressures from near zero to well above that on ocean floors, and to survive direct exposure to dangerous radiations. The far-ranging survivability of these extremophiles was tested in 2011 outside an orbiting space shuttle. Tardigrades are so durable partly because they can repair their own DNA and reduce their body water content to a few percent.” <http://apod.nasa.gov/apod/ap130306.html>

moss, their primary food. Their amazing hardiness warranted the expense of sending them into space. Who knows what we might learn from them. They are abundant at Heritage Village since a clump of moss the size of a muffin will hold far more than 100,000.

Video of tardigrades swimming and eating, narrated by Neil deGrasse Tyson at <http://tvblogs.nationalgeographic.com/2014/03/19/5-reasons-why-the-tardigrade-is-natures-toughest-animal/>

Tardigrades are water-dwelling, short and pudgy micro-animals with sharp teeth, an ugly face, and eight legs. Being only 1 mm long, they are hard to see without a microscope but their tiny size lets them avoid the attention of predators and is just right for their life of swimming around in the water that sheaths



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by Sandy Planisek 2015
Issue #18