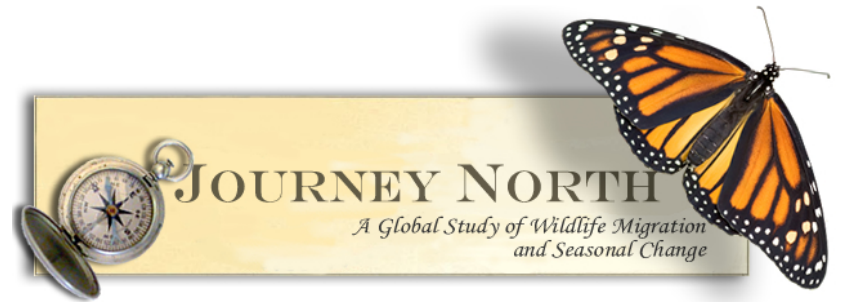




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Temperature and Survival The Balance Between Warm and Cold



Photo © Lincoln Brower, Sweet Briar College

by Elizabeth Howard

It's Cold in Mexico!

During the day it's usually warm at the monarch's winter home in Mexico, but at night it's as cold as the inside of your refrigerator! Sometimes it's even cold enough to snow. Most people are puzzled when they hear this. Why do monarchs migrate across the continent to spend the winter in a place that is *cold*?

As it happens, monarchs need cool temperatures to survive. Let's find out why, and let's see how the monarch's forest helps to protect them.



1

Cold Temperatures and Survival

"Since monarchs are cold-blooded, they do not use much energy when they are in a cool environment," says Dr. Karen Oberhauser.

Monarchs arrive in Mexico with fat (lipids) stored in their bodies. They eat very little, if anything, during the winter months. Because of the cool temperatures, the butterflies burn their food reserves slowly.



2

Monarchs must not get *too* cold!

Monarchs save energy by living in a cool place, but there are also dangers. If temperatures are too cold, monarch butterflies can freeze to death. *Wet*, cold monarchs are in particular danger. Ice crystals can form on the butterfly and kill it.



3

Another danger: Paralyzed by cold!

Monarchs can't fly unless they can warm their muscles to 55°F. They can't even crawl below 41°F. The monarch pictured here can only crawl. It took one hour for this butterfly to crawl a few feet. Although monarchs can save energy when they are cold, the cold also makes them vulnerable.

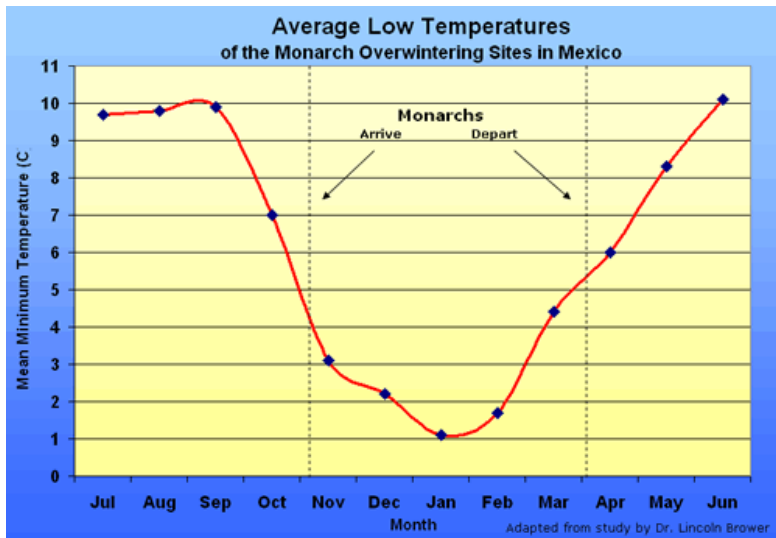


4

When can it be dangerously cold?

"January and early February is the coldest time of the season. This is a really critical time for the monarchs," says Dr. Lincoln Brower.

"We know temperatures below -8°C will kill about 50% of the monarchs. However, if the butterflies are also WET, it will kill close to 80-90% of the monarchs."



5

Warm Temperatures Also Dangerous

If temperatures are too warm during the winter, the butterflies will burn their stored fat too quickly. Like running out of gas, they won't have enough energy to survive the winter and migrate north in the spring. Monarchs store lipids in their abdomen. With practice, a person can tell the condition of a monarch.



6

The Forest Protects the Monarchs

Outside of the forest, the temperature can rise and fall sharply between day and night. Inside the forest, the temperatures don't change as much. Dr. Brower often says the monarch's forest is like a **blanket** and an **umbrella**. It protects the monarchs from **cold** and **moisture**. If the forest is cut or thinned, he says, monarchs will not have the protection they need.



7

Visiting a Colony on a Cool Day

On a cool day you can see many ways cold temperatures affect monarch butterflies. For example, cold monarchs are clumsy when they try to fly. They often fall out of the air and land in funny places. This cold monarch landed on a mustache!



8

Crawling to Safety After a Storm

If you visit a colony on a cold day you might see monarchs on the ground. Strong winds and heavy rain can blow monarchs down from their clusters. If the monarchs are cold, it may take hours — or even days — for them to return to the safety of the cluster. Slowly but surely, the monarchs pictured here are climbing back to the trees after falling during a storm.



9

Monarchs Can Survive a Snowstorm

It even snows occasionally in the colonies in Mexico. "If buried by snow, monarchs might stay on the ground under the snow for more than a week!" says Dr. Bill Calvert. Amazingly, many can survive a snowstorm *if they can stay dry*.



10

Shivering to Warm Muscles

The most obvious thing you'd see on a cold day in a colony would be this: The forest floor would be alive with shivering monarchs. The butterflies move their wings so quickly they are blurry. You can even hear their wings as they flutter against nearby leaves. Monarchs shiver to warm their muscles. After shivering, monarchs can crawl and fly at temperatures that would otherwise be too cold.



11

The Forest Floor is Dangerous

On a cool day in a monarch sanctuary, you will always see monarchs climbing. They seem to climb on *anything* they can find. They climb to the top of sticks, twigs, and tiny trees like the one pictured here. Monarchs struggle very hard to get off the ground because the forest floor is a dangerous place. On the ground, monarchs are exposed to predators, dew, colder temperatures and even frost.



12

How are temperatures today?

You can track real-time weather information at the monarch overwintering region in Mexico. Now that you know how temperatures affect monarch butterflies, you can imagine exactly what's happening.

See: Monitor the Climate in Mexico

<http://www.learner.org/jnorth/tm/monarch/ClimateMonitorMonthly.html>

