THE
ATMOSPHERICRESERVOIR
Examining the Atmosphere and Atmospheric Resource Management

"The Physiological Effects of Weather"

By Mark D. Schneider

Dave Dyet was on his way to work, in Yellowknife, NWT Canada. It was -42c.

The Merriam-Webster Dictionary defines Physiology as a science that deals with the ways that living things function. Understanding how and why the weather affects us physiologically can make a huge difference in the way we feel. During periods of cold weather, especially this time of year, our fingers and toes are susceptible to vasoconstriction, or narrowing of blood vessels, which results in a decrease in blood circulation. This is a self-defense mechanism of our body, which acts to retain heat by increasing vascular resistance. Hands and feet become cold and can remain that way unless they're insulated with gloves and boots or if circulation is increased by body movement and exercise. The wind is also an important factor in our ability to stay warm. When wind passes over exposed skin it speeds up our body's rate of heat transfer. This is the wind chill that we feel which can lead to frostbite and even hypothermia unless protective clothing is worn. Wearing layers of clothing helps because each layer is slowing the rate of heat transfer by trapping warm air and insulating us.

In addition to the days being shorter with less sunlight, cloudy skies and cold weather can take a toll on our physical and mental well-being. North Dakotans sometimes associate this time of year with a "mid-winter slump." There's good reason for wanting more sleep or feeling sluggish because our bodies' sleep cycles are largely controlled by daylight. Icy sidewalks and walking paths make it more difficult and sometimes hazardous for us to get exercise outdoors. It's no wonder why indoor gyms and fitness facilities see new memberships and higher attendance in January as we persevere over the elements and attempt to reverse the physiological sluggishness that accompanies the season.

As winter fades and spring transitions to summer, North Dakotans will once again be exposed to warm or hot weather conditions when symptoms such as drowsiness, exhaustion, and dehydration can occur. Our bodies' greatest defense mechanism against heat is to sweat. As sweat evaporates, cooling occurs because heat is removed from our skin. The moisture in the air and wind speed determine how fast sweat evaporates. In general, the drier the air and stronger the wind, the faster our bodies cool. Weather reports make mention of the heat index when the air temperature and relative humidity are high. High water vapor content in the air works against us by reducing the evaporation rate of sweat from our body, making the air temperature feel warmer than it actually is. During the winter when frigid temperatures occur, we don't concern ourselves with relative humidity because there's very little actual water vapor in the air. So relative humidity becomes trivial during the wintertime, but important during the summer.

No matter what season it is, we're affected by the weather in ways that we don't consciously realize. Our bodies are constantly trying to maintain their equilibrium against the ever-changing environment of weather around us.

Atmospheric Resource Board
North Dakota State Water Commission
900 East Boulevard, Bismarck, ND 58505
(701) 328-2788 • http://swc.nd.gov

ND Weather Modification Association
PO Box 2599, Bismarck, ND 58502
(701) 223-4232