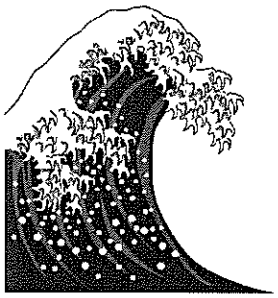

READING:

It's Not the Heat, It's the Humidity

Have you ever heard an uncomfortable person say, "It's not the heat, it's the humidity?" They are suffering not only because the temperature is high but also because the air is damp. Maybe you've heard another weather cliché—"It's hot, but it's a dry heat." That saying downplays the discomfort one feels in high temperatures in dry climates. When the air is dry, heat is not so oppressive. What do these expressions mean, and are they true?

Water is present in air as a **vapor**. We see water **condense** from the air when drops appear on cooling surfaces. For example, a glass holding a cold drink will get wet on the outside. **Dew** forms on low-growing plants and other surfaces when the temperature drops at night and reaches the dew point. These examples also tell us that warm air can hold more water than cool air.

In 1783, Horace de Saussure (1740–1799) used a human hair to tell if the amount of water in the air was high or low. As many people notice when they complain about a "bad hair day," the length of a hair varies according to humidity. Saussure's invention and other devices that measure water vapor content are called *hygrometers*. Some hygrometers compare temperature data from wet and dry thermometers. With that information, you could then read a chart telling **relative humidity** for each difference.

If the air were **saturated,** or full of water vapor, it would be holding as much vapor as possible at that particular temperature. Any new water evaporating makes vapor already in the air condense, or become liquid. Think about a foggy night when the air feels wet. Relative humidity measures the percentage of the maximum water vapor the air is currently holding.

If you can safely get near a heater that is blowing warmed air (a heat vent in a room or the outlet of a clothes dryer will work), try this experiment. Hold your hand in the path of the heated air and notice how warm it feels. Then wet your hand with room temperature or warm water. Place your hand in front of the heater again. How does the air feel now?

Even though the water on your hand is warm and the air hitting your hand is also warm, you feel a cooling from the heater's air flow. That's because the water on your hand is evaporating and that requires energy. Your hand is cooled.

You can measure relative humidity using two thermometers. If you keep the bulb of one thermometer wet and one dry, their temperatures will differ. Some of the water around the bulb of the wet thermometer will evaporate. Measure the two temperatures and plot them on a chart. The greater the difference between the two temperatures, the lower the relative humidity. Can you explain why?

The wet bulb temperature will be lower because the evaporating water creates a cooling mechanism. The water's change in state from liquid to gas requires energy, which it removes from the air in the form of heat energy. As the heat is absorbed by the evaporating water, the temperature around the wet bulb drops.

A large difference between temperatures means lots of evaporation is occurring around the wet bulb. The relative humidity is low so the air has lots of capacity to accept water vapor.

A small difference between the wet bulb and dry bulb temperatures means little evaporation is occurring and relative humidity is high. The air's capacity for water vapor is small. There is no room for newly evaporating water unless some vapor already in the air condenses.

Let's return to our two weather sayings. When someone says, "It's not the heat, it's the humidity," they are probably sweaty and sticky. **Perspiration** is the body's way of cooling itself. Water evaporates from our skin, using heat energy to change from liquid to vapor. The process of cooling is happening in the same way the blowing heater cools a hand in the example described earlier. But on a humid day, the air is closer to saturation, and perspiration evaporates slowly. Cooling does not occur. In a dry climate, water evaporates quickly, so if we perspire, the water evaporates quickly and we feel more comfortable. That means a dry heat is more comfortable than a humid heat. However, some climates are dry but so hot that people still feel uncomfortable. After all, an oven is a dry heat, too!