First Unitarian Universalist Society of Albany, New York

"Nature's Stillness"

Rev. Samuel A. Trumbore December 13, 2020

Sermon

The first snow on Wednesday to blanket roofs, lawns, roads, and bushes reminded me of the stillness that happens as snow dampens sound waves. There is a softness to sounds that can't reflect and bounce around as much. The snow also drives any lingering animals into their burrows convincing them it is time, maybe past time, to start hibernating.

The phenomena of hibernation, of being still, enduring cold temperatures and lack of food, are marvelous evolutionary adaptations to a colder climate. The ability of life, over many generations, to adapt to threatening atmospheric conditions is amazing. And yet, humanity is still quite limited in this regard. I know more than a few people who would be quite content to skip winter, take a long nap, and wake up again with the daffodils and the forsythia. But that isn't an option. Staying in bed longer than a week initiates deleterious effects on the body. Our health and well-being require us to keep moving.

But that is right now, what might the future hold? Do we have genes already that might be activated? Are there features of hibernation that could be adapted for human use? What benefits might humanity enjoy if we could?

Were we to enjoy tropical temperatures all year around with sufficient rain and sun, there would be ***no need*** to hibernate. Hibernation evolved as a way for plant, insect and animal life to cope with life-threatening seasonal conditions of both cold and heat. It is a state of decreased activity and depressed metabolism for warm blooded creatures. In winter this means a lower body-temperature, the slowing of the heart-rate and breathing, and the slowing of the metabolism. Creatures like reptiles that don't regulate their body temperature also will hibernate often with even greater reductions in activity.

Hibernation isn't like sleep. It isn't so much restful as a diminishment of activity, including brain activity. Hibernation is more like going into suspended animation. The normal REM sleep activity that is restorative to the brain doesn't happen during hibernation. In fact, activity can get so slow and depressed that it would seem as if that hibernating creature was dead.

The wood frog is an interesting case study. Unlike some frogs and toads, they do not bury down below the frost line. Wood frogs might only be covered by a pile of leaves for its winter lair. And when the temperature goes below freezing, so will the inner temperature of the frog. It will actually freeze solid – but not freeze completely. It keeps its temperature just below the freezing point allowing ice to form around its cells but protects the cells from freezing and being damaged. Not only the wood frog but the gray frog, spring peeper and chorus frog all exhibit this behavior. Ice fills their body cavities. They protect themselves well enough to not endure inner temperatures below -8 Celsius which will kill them.

Rodents are another interesting group of animals that have a lot of variation in their adaptation to cold weather. Tree squirrels do not hibernate at all, though they may go through short periods of

torpor on very cold periods. This may be because they have access to food such as nuts and tree buds. Ground squirrels, chipmunks, and woodchucks are much more likely to be hibernators as snow and frozen soil limits their access to food. Chipmunks will hibernate for six months. They will gorge on food in the fall to build up their reserves of fat to get them through without eating.

The most remarkable hibernating squirrel is the Arctic Ground Squirrel. I selected a picture of one for the Google slides background. When the Arctic Squirrel hibernates, its core temperature can drop below freezing too, though it doesn't freeze the way the wood frog does. It can still regulate its body temperature and keep it just below freezing.

The creature most people think of when you say hibernation is bears. Because their body temperature doesn't drop very much when they hibernate, some questioned whether you could classify them as hibernators. But in just about every other way, they exhibit many of the same behaviors and adaptations that go along with hibernation. They gorge on food before they retreat into their cave or sheltered tree roots or even tree nest. They remain inactive for the winter months with many physiological changes to adapt to that inactivity.

Those adaptations are quite interesting because they are adaptations humanity can't replicate.

Were some folks to decide to imitate how a bear hibernates, they would fail. They'd have no problem with the gorging part I expect but that is where the similarity would end. The first problem they'd encounter is having to get up to relieve ourselves. And they would need a drink not long after that to replenish their hydration. People need to flush the urea out of their bloodstream through their kidneys that is the result of metabolism that keeps us warm. Bears don't have that problem. They don't need to drink or urinate during their whole hibernation period. They've developed the ability to not create urea but rather creatine which doesn't need to be excreted and can be stored or used by muscle tissue.

The next problem human hibernator wannabes would encounter would be trying to stay still longer than a week. Anyone who has been bed ridden will know the problems. The muscles start to waste away. The skin develops pressure sores. And the blood starts clotting. And if it goes on long enough, the bones demineralize. Not moving is dangerous for our health.

Somehow this doesn't happen to bears. They burn through their fat reserves but don't suffer skin lesions or lose any muscle tissue or suffer from blood clots. They wake as strong as when they began to hibernate.

We haven't made these adaptations because living in a cold climate is a relatively new thing for us on an evolutionary time scale. Tens of thousands of years isn't long enough for us to evolve what the bears have evolved. Heck, we don't even have enough hair to stay warm.

If our temperature drops more than 3 degrees Fahrenheit our body goes into hypothermia and starts shivering uncontrollably to generate heat. Our bodies pull the blood away from our limbs to keep our internal organs safe, willing to sacrifice fingers and toes to frostbite in the process. We are just not well-adapted to the cold.

Yet, if we ***could*** replicate some of the clever tricks the bear's bodies know how to do, it would make a big difference! Long distance space travel would be much more possible if astronauts could be put

into a hibernation state slowing their metabolism to consume less energy. Just being weightless causes the same problems as if being bedridden with muscle and bone losses. It takes a lot of exercise and weight bearing on the space station to keep the astronauts healthy.

Hibernation would also be helpful for treating severely injured people. Inducing a kind of hibernation state could stabilize them long enough to deal with their injuries before the body would break down and stop functioning after just a few minutes. And in extreme famine and drought, were humans able to hibernate, they could survive till aid arrived or conditions changed.

What is tantalizing is signs that humanity may have capacities we don't realize. One fascinating story is about a Swedish radiologist trapped under a layer of ice for 80 minutes in freezing water in 1999. A skilled skier, she lost control on a familiar slope and fell headfirst into a frozen stream near a waterfall. A hole opened in the 8-inch-thick ice and her head and torso were pulled in. The fellows she was skiing with her found her with only her boots and skis sticking out from under the ice. By the time they got her out and into a helicopter to the hospital, her body temperature was 56.7 degrees Fahrenheit. 100 doctors and nurses worked on her for nine hours to externally warm her blood and get her heart beating again and her internal organs functioning. She was able to make a full recovery with no brain damage, returning to her job as a radiologist.

And here are more anomalies to ponder. Perhaps some of you have seen pictures of naked yogis practicing meditation in the snow with no ill effects. In the early 2000's, Dr. Herbert Benson studied Tibetan monks who have the unusual ability to generate heat even in winter weather. Benson documented these bare-backed monks being wrapped in sheets soaked in ice-cold water meditating in an ambient temperature of 40 degrees. Steam would start rising from the sheets. Those sheets would be dry in an hour or so. He covered the monks in wet sheets three times with the same effect. The monks technique is called g Tummo meditation. It combines breathing exercises with strong visualization of flames shooting up the spine that seems to activate an ability most of us are unaware of.

No discussion of stretching human abilities to deal with the cold can be complete without mentioning Wim Hof. He is an extreme athlete who has developed an amazing ability to resist the cold. He can swim under ice for significant distances. He climbed Mount Kilimanjaro in shorts. He ran a half marathon above the Arctic Circle barefoot. He stood in a container while covered with ice cubes for more than 112 minutes. Using his body's response to cold as his teacher and through extensive training to withstand extreme temperatures, Hof has developed these abilities by controlling his breathing, heart rate and blood circulation. And he'll teach you too if you are willing to take his classes.

Part of his method is to require people to take long cold showers. This shock to the system activates inner changes that take about a month to get going but can then change how our bodies deal with the cold. I'm not ready to do that experiment quite yet … but his feats and his ability to teach others suggest our biological capabilities may be greater than we realize.

I expect we probably know a tiny bit of that already. The cold bothers me far more in October than it does in January or February. My blood does seem to "thicken" over that amount of time. The reverse was true living in Florida. It took a while to get used to being hot and sweaty all the time.

But after a year or two, I got quite comfortable with the heat and humidity. Even the tiny no-see'ms biting me.

One effect of global climate change is we are getting a much greater appreciation for the value of being cold. We need snow covered, frozen arctic waters to reflect the sun's rays in the summer. To prevent sea level rise, we need the ice to stay frozen in Greenland and Antarctica. To keep methane, a potent greenhouse gas, out of the atmosphere, we need the permafrost to stay frozen. We need to retain glaciers that are the source of fresh water in the summer for many, many peoples. In other words, cold is very important for the continuation of human civilization.

While we may not be able to hibernate like other creatures, we can take advantage of the stillness we can enjoy ***while they*** are hibernating. During these cold winter days, we can be grateful we aren't being disturbed by insects buzzing around our heads. Walks outside in natural settings can be more enjoyable without a lot of noise or disturbance. The stillness of the air can help bring stillness to our minds and spirits. And if that comes with being cold outside, I can adjust.

May the stillness of winter, rejuvenate us through the decrease in sensory stimulation.

May the stillness of long nights, be a time to enjoy rest and relaxation.

May the stillness of outer activity, be an invitation to explore inner space.

May the stillness heal and renew us as prepare to enter a new year, a hopefully much better year than 2020