

December 21, 2004

The Mystique of the Winter Solstice

Caught up in the rush of the holiday season, many of us are unaware that a profound celestial event takes place this month. Today, December 21, marks the occasion of the winter solstice, the shortest day of the year and the first official day of winter. Ironically, just when nature is slowing its pace to a crawl, when myriad species are deep in hibernation, modern society is charging full steam ahead, gripped by a frenzy of shopping and festivities.

At the solstice, the northern hemisphere is tipped farthest away from the sun. From our perspective, we see the sun tracing its lowest arc through the sky. Even at noon, it remains relatively low in the southern sky. Because the sun rises in the southeast now and sets in the southwest, its trajectory through the sky is also much shorter. This, in turn, results in an extremely short day. At the solstice, Peterborough receives only eight hours and 51 minutes of daylight. Compare this to the 15 hours and 32 minutes of daylight we enjoy at the summer solstice on June 21!

The solstice is an appropriate occasion to reflect on why we have seasons. A good starting point is to think of a globe. You have no doubt noticed that a globe is tilted - as is the Earth. In other words, the imaginary line between the Earth's north and south poles is not vertical but on a 23 and a half degree angle. Because the Earth is also rotating on its own axis, the end result is that the northern hemisphere ends up being tilted towards the sun for part of the year - our summer - and away from the sun for part of the year - our winter. The consequences of this tilting are profound.

Let's look at winter first. The tilting away from the sun means the sun remains low in the sky, even at noon. The sun's light is therefore coming in from the side and ends up scattering over a greater area. This, in turn, results in less heating. In June, however, when Peterborough is tilted towards the sun, the sunlight is coming in from directly above. It is therefore much more concentrated and creates more warming. You can illustrate this by pointing a flashlight at a table top. Shine the beam directly down on the table so that the light focuses on a small area. The table top will eventually feel warm to the touch. This is our summer. To create winter conditions, angle the beam to the side so that the light scatters over a larger area. Significantly less heating will occur.

The solstice has always been a time of awe and amazement. It is any event that was noticed and celebrated by cultures all over the world and, in the opinion of some, was a precursor to faith. As ancient peoples would watch the sun rise and set further and further south each day and notice the hours of daylight grow shorter, they would almost certainly fear the sun's complete disappearance. Many would think the end of the world was coming, especially since so much around them in late fall would appear dead or dying. Without sunlight, there would be no life. Thoughts would inevitably turn to ghosts and evil spirits. But, just when the world appeared to be on the brink of utter darkness and oblivion, the sun would suddenly stop its southward march in sunrise and sunset points. Its noontime elevation, too, would cease to descend lower and lower in the sky. It would essentially "stand still" for several days, before once again proceeding to move northward and to climb higher and higher in the sky. The joy and reverence that ancient peoples would feel are not hard to understand. The word solstice is of Latin origin. "Sol" means sun, and "stice", means a stoppage.

The celebration of the solstice existed in many cultures. Ancient Mesopotamians celebrated 12 days of fire building in an effort to "rekindle" the dying sun. The Romans payed homage to Mithra, the Persian god of light, in their Celebration of the Unconquered Sun which took place in

December. Pope Julius I in 350 AD declared December 25 as the birth date of Jesus, purportedly to take advantage of these well established solstice festivities dating back to Roman times and to possibly attract new followers to Christianity. Many of the symbols of Christmas such as light and the rebirth of hope harken directly back to solstice celebrations. The Jewish feast of Hanukkah and the Scandinavian feast of St. Lucia (Lucia meaning “light”) also share light as their primary symbols.

A most fascinating example of the importance of the solstice can be found in Ireland. 5000 years ago, ancient peoples built a circular, stone burial mound called Newgrange as a marker of this celestial event. It was constructed in such a way that on the morning of the solstice, a shaft of sunlight would pass through a window and passageway, beam across a chamber and shine upon a stone wall for about 17 minutes. It is believed that Newgrange was initially designed so that the sun would illuminate the ashes of the dead, buried deep in the tomb. This may have been done to offer the departed a chance for “rebirth”, by bathing them in the light of the reborn sun. To warrant the construction of such an intricate celestial clock, the solstice obviously had to have a huge significance in their lives.

Another common element to both solstice and Christian traditions is the evergreen. It is intriguing how the two solstice themes of light and evergreen have combined to make one of the dominant symbols of modern Christmas: the Christmas tree. Conifers represent the tenacity of life in the dead of winter- and justifiably so. A host of amazing adaptations allow these trees to keep their needles and to possibly even carry out photosynthesis on mild winter days. The thick, waxy coating of cutin, for example, greatly reduces water loss from the needles. Nor is snow and ice-loading usually a problem. The tree’s conical shape comes to the rescue. As snow and ice pile up on the needles, the branches begin to droop and are supported by the tier of branches below. The lowest branches are supported by the ground. A snow-laden conifer becomes a very stable tepee-like structure. This is all made possible because conifers have only one trunk growing straight up and lateral branches growing to the side.

For people of northern climes, the winter solstice represents the assurance that the days are once again growing longer and that spring will indeed come. Unfortunately, we must still be patient because the process of recovering daylight remains quite slow until mid-January. The solstice also reminds us of the close links between the celebrations of the holiday season and the rhythms of the natural world. Take time to notice how the sun, the moon and the stars change over the course of the months, days and even the hours. The more we force ourselves to notice, the more we develop a sense of how nature and the heavens are different with each new season. Being aware and noticing is the first step to caring about the precarious state of the natural world in this new millennium.

What to watch for this week

This is a great time to get out and learn how to identify our native conifers by studying the differences in the needles. With practice, these trees can also be identified by shape, even at a considerable distance. Most winter hardwoods, too, can be identified by shape. Recognizing distant trees adds interest to long car trips.

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