

THE STARRY SIDE

# Tilt gives us seasons

BY GREELEY WELLS

The earth does not always rotate around the sun at a 90-degree angle. If it did, as you went north and south from the steamy jungles and deserts of the equator the weather would get evenly cooler at each latitude (imaginary lines parallel to the equator), but it would be the same weather all around the world at that latitude, all year long—no real variations. Luckily, the earth's axis is tilted at 23.5 degrees. So when the North Pole tilts towards the sun we get summer, and when we are halfway around the sun six months later the pole tilts away from the sun, giving us winter.

The tilt of the earth also explains why we have relatively minimal seasonal differences at the equator and extreme seasonal differences at the poles. The poles can be completely frozen and dark for a chunk of time, and six months later completely sunny and hot for another chunk of time.

Between the extremes of the equator and the poles, seasons vary widely. Different people, plants and animals live at different latitudes that meet their particular needs for warmth, food and propagation. Thus, the tilt of our planet gives us an incredibly wide diversity of life.

**THE NIGHT SKY**

At our 42 degrees latitude, here comes fall again. Just when we've had enough of the hot weather, so longed-for at the end of winter, we now long for coolness!

In September the Big Dipper is to the lower left of Polaris, the North Star. During fall, the Dipper swings around towards the lower right of Polaris. If you face north and think of Polaris as the center of a gigantic clock, the Dipper will move counterclockwise from about a 7 o'clock position in September to about a 5 o'clock position in November. Cassiopeia moves similarly in relation to Polaris from about 2 o'clock in September to about 12 o'clock in November. Viewed at the same



Turn the page so the Big Dipper is below, and imagine Polaris as the center of a clock; then read the fifth paragraph of this article.

Illustration: Guy Ottewill's *Astronomical Calendar 2012*.

time each night, each quarter turn of this North Star "clock" can be used to measure a full season.

The large square of Pegasus begins in the east in September, then moves overhead in October. In November Pegasus starts its fall into the west (*fall, get it?*), heralding the rise of the winter constellations in the east. September sees little Pleiades rising in the east-southeast (meaning a little farther east of southeast). In October comes Taurus the bull, that small "V" with the bright Aldebaran on one corner. Next, Orion appears in November, leaping up from a prone position on the eastern horizon

with the Gemini twins rising above his head. December finds all these big, bright constellations overhead and large Pegasus setting in the west. Quite a show: on the doorstep of winter, seasons are brought to you by the tilt of earth!

**THE PLANETS**

Jupiter is moving easterly in the westerly-moving sky. Jupiter rises around midnight by the end of September. By the end of October, he is rising after 10 pm. (On October 25, Jupiter makes an almost perfect equilateral triangle with Mars and Regulus in the dawn sky.) November has Jupiter rising shortly after sunset

and increasing in brightness. As Jupiter moves east, he rises earlier and grows brighter all fall.

Venus rises higher and higher during fall. Beginning low in the sunset, by September 7 she rises after Spica, and then after the brighter Saturn on September 19. By October 31, Venus shows up 150 minutes after sunset. A crescent moon floats near Venus on September 8 - 9 and October 6 - 8.

Mars crosses the beehive star cluster in Cancer (M44) on September 24 - 25. Mars then catches up with Regulus on October 14; Mars and Regulus come really

close together on October 15 in the morning sky (Regulus will appear slightly brighter).

Saturn mates with Venus below and a crescent moon at dusk on September 9. Saturn, Mercury and the moon form a small "triangle" after sunset on October 7. In November, Saturn rises low in the dawn sky, along with a dimmer and lower Mercury.

**OF NOTE**

Major meteors this season (Orionids on October 21 and Leonids on November 17) will be very unfavorable primarily because of the moon. However, Taurids on October 10, though minor, are likely to be favorable. And for early risers, after the moon sets shortly before dawn December 4 - 17, the Geminids could be spectacular. The radiant is the Gemini twins over Orion's head. December 13 is the best night (that's Friday the 13th, by the way).

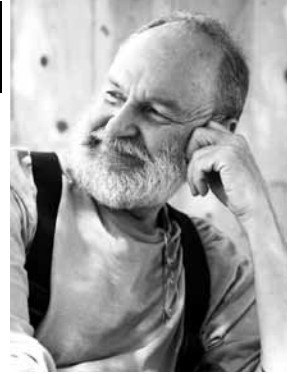
On Sunday, November 3, set your clocks back one hour to get back to standard time. Isn't it comforting to be back? Because the time between 1 and 2 am is technically repeated, I guess that means we get an extra hour that night. At least now noon is noon again.

Hallowe'en, or the eve of All Saints Day, is October 31. Astronomy Day is Saturday, October 12. Celebrate!

The full moon on September 19 is called the Fruit Moon. The full moon on October 18 is the Harvest moon; the Sioux call it the Dying Grass Moon. The November 17 full moon is known as Hunter's, Frosty or Beaver Moon. Imagine the interesting stories behind these moons!

May deep, dark, and clear skies be with you.

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