

# Mountain Skies

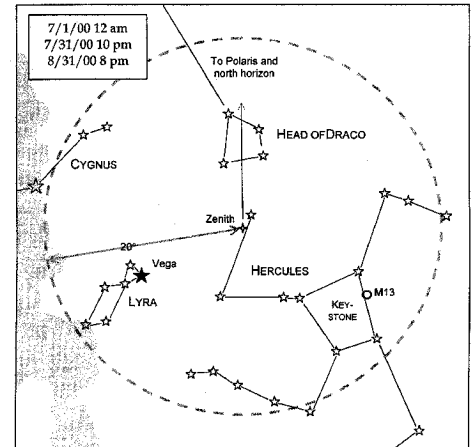
## July and August, 2000

After gathering for the sunsets and sunrises of spring, the planets begin to separate as July begins. Mercury, Venus and Mars lurk near the sun through August. Jupiter and Saturn, however, having passed behind the sun, rise higher and higher in the predawn sky. In early July they will be easy to spot as they rise by 3 a.m. and are 30° above the horizon by the time the sun rises after 5 a.m. As Lughnasadh (Loo-nas-sa), Celtic autumn, begins on August 1, the giant worlds rise just after 1 a.m., and they rise before midnight by the beginning of September.

Not only are these worlds high in the sky before the morning twilight begins, but their sizes keep them quite bright even as they shine from the far side of the sun. Also, they are in the midst of

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one of the most spectacular star fields in the sky between the star clusters of the Pleiades and Hyades in Taurus. They begin July separated by about 4°, just to the west of the line between the Pleiades and Aldebaran (emphasis on DEB), the red eye of the bull, whose name



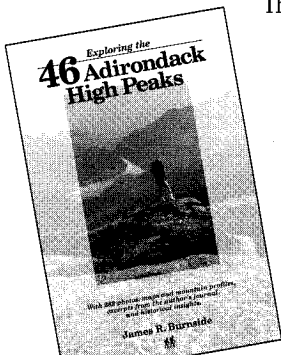
translates as The Follower. Jupiter, in its swifter orbit, moves eastward, away from Saturn, doubling their separation by September 1. Adding to the beauty of these planets and stars is the waning crescent moon on July 27 and August 23.

The warmth of summer that draws many of us out to hike and camp also gives us a chance to reacquaint ourselves with the clock of the stars that our ancestors knew so well. The diagrams show a window of the sky directly above an observer at 45° north latitude. Centered on the zenith are 20° circles. If you hold your hand out at arm's length and stretch your thumb away from your pinky, the tips of your thumb and pinky will be about 20° apart; thus the circles shown are about the width of your two hands stretched out and held thumb to thumb. Since the stars move from east to west at the rate of 15° per hour, the positions of the stars can easily be used as a clock once a few constellations are known.

As the sky darkens at about 10 p.m. on July 31 (or midnight on July 1), Hercules' foot is very near the zenith. Hercules, the kneeling one, hangs with his head and arms to the south, making the narrow end of the keystone his waist and the keystone itself his hips. On the western edge of the keystone is a cluster of stars known as M13. This is one of the globular clusters of mostly old, red stars that do not rotate with the disk of the galaxy, but orbit the center on independent orbits.

Comparing our motion with the gridwork of these orbits allowed us to

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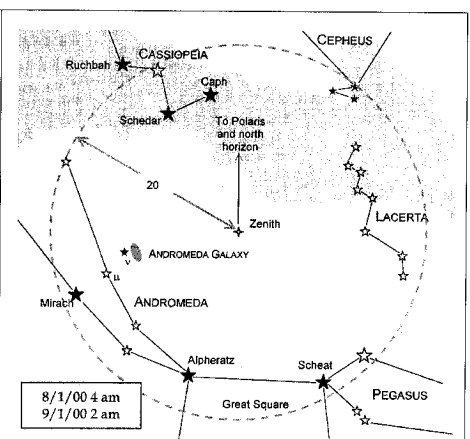
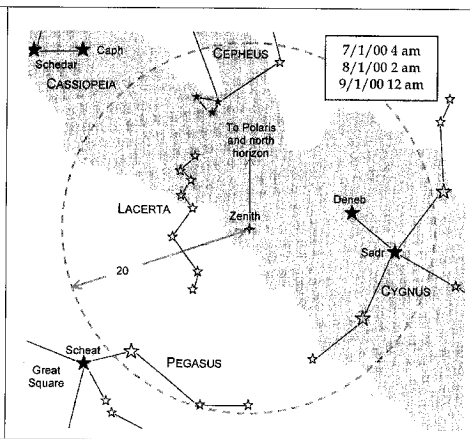
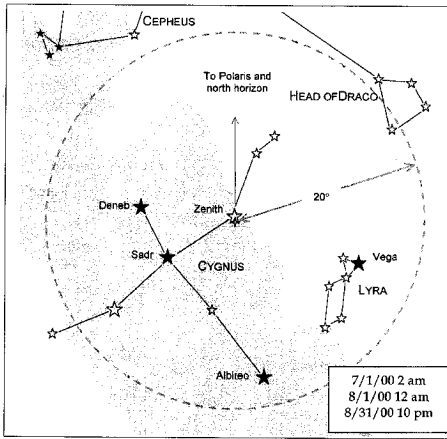
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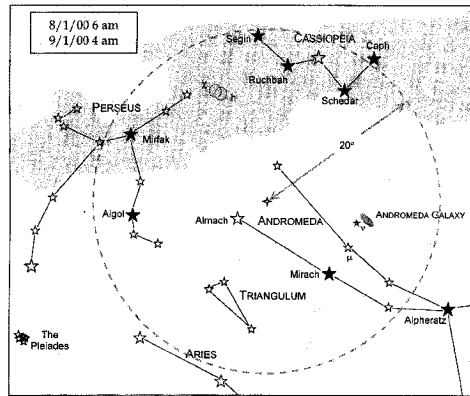


determine that the sun orbits the galaxy once every 200 million years. This makes the sun about 20 galactic years old and has us clipping along at 200 km/s in the direction of Cygnus, lurking just to the east. With well-dark-adapted eyes and a dark sky, a keen observer might be able to detect the smudge of this star cluster. The rest of us need binoculars at a campsite and a telescope in town.

The head of Draco is also very near and just north of the zenith. The bright star southeast of the zenith is Vega (formally VEE-ga, but most commonly called VAY-ga), the swooping eagle of the summer triangle (Mountain Skies, September/October 1999). This star in Lyra (LIE-ra), the Lyre, is 26 light years from Earth and was made famous by the movie *Contact*.

As the Celts bid the summer season of Beltane farewell at midnight on August 1, Vega has moved west of the zenith, and Cygnus (SIG-nuss), the swan, with its bright stars Deneb (DEN-ebb), Sadr (SAD-der), and Albireo (AL-BEER-eeo), has moved into the roof of the sky. The swan wings her way along the bright starfields of the Milky Way, our own spiral galaxy seen edgewise from our vantage point 30,000 light years from its center. Sagittarius, close to the southern horizon at this time, is in the direction of the center of our galaxy (Mountain Skies, July/August 1999). If you have the chance to view Cygnus from a high camp far from lights, the brightness and richness of the Milky Way may send your heart soaring with the swan and the swooping eagle!

Two hours later, the swan is west of the zenith and only faint Lacerta (LASUR-ta), the lizard, is near the zenith. By 4 a.m. on August 1 (after dawn on July 1, 2 a.m. on September 1), Cassiopeia and Andromeda, mother and daughter chained in the summer sky, come within 20° of the zenith, along with Pegasus, the winged horse that Perseus rides to rescue Andromeda. If you view this from a campsite, be sure



to look for the Andromeda Galaxy [use Mirach (MY-rack), μ (mu) and ν (nu) as guides] with your dark-adapted eyes and it may literally seem to jump out at you. Perseus, on his way to rescue

Andromeda by using the head of Medusa, whose evil eye is marked by the star Algol (AL-goal), makes his way into the 20° circle by 6 a.m. on August 1, when the sky is in the throes of the first morning twilight of Lughnasadh but the skies of September 1 are still well dark. Just outside the circle to the south is Aries, the cosmic hockey stick hinting of the coming winter. The challenge for sharp observers is the pair of star clusters, η and χ (chi) Persei (PER-see-eye) between Cassiopeia's eastern side and Perseus. Another, more familiar, more spectacular star cluster, the Pleiades, lurks just east of the zenith at this time. By 6 a.m. on September 1, the Pleiades, along with Jupiter and Saturn, will be south of the zenith, just outside the 20° circle, but fading quickly in the late summer dawn.

—Aileen O'Donoghue

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