

# Mountain Skies

## November and December 2002

**A**S THE FIRST DAWN TWILIGHT of November begins to brighten the eastern sky, Jupiter and Saturn are high and bright. Jupiter is the brighter of the two. The distance between the giants increases through the month. Jupiter's motion covers only two degrees of the sky in a region of Cancer devoid of bright stars. Saturn, however, moves almost five degrees, from just north of  $\chi$ 1 (Chi1) Orionis to just north of  $z$  (Zeta) Tauri (Diagram 1), making its motion easily detectable over the course of two months.

Saturn can be seen in the evening as well as the morning as it rises at 7:30 P.M. on All Hallows Eve. Jupiter doesn't rise until 11:30, as the candles in the jack-o-lanterns start burning out.

On December 17, Saturn is at opposition—exactly opposite the sun in our sky as Earth passes between the local star and the ringed planet. It rises at 4:20 P.M., the same time that the sun sets on that day. Jupiter rises at 8:30 P.M. by this time and by New Year's Eve will rise at 7:30 on its way to opposition on Groundhog Day 2003.

### Gossips

Mars hangs  $15^\circ$  below a thin waning crescent moon as it rises two and a half hours before the sun on November 1. By December 1, the waning crescent moon joins Mars and Venus in a nearly perfect equilateral triangle,  $2^\circ$  on a side. Our two nearest planetary neighbors then remain close (within  $5^\circ$ ), as though gossiping over the fence. Our very near neighbor, Luna, makes the group a triangle again on December 30, though it's isosceles this time. At the end of December, Mercury swings around the far side of the sun and rises into the evening twilight sky and is farthest from the sun on Boxing Day, December 26. Though it

sets 90 minutes after the sun, it is only  $12^\circ$  above the horizon at sunset, and is hard to see in the fading twilight.

As the approaching winter solstice darkens the sky early in the evenings, the glittering Milky Way in Cassiopeia and Perseus rises in the northeast. Mirfak (MEER-fack, the elbow), Algol (AL-goal, the demon star representing the eye of Medusa), and Atik (AY-tick, the shoulder blade) are the brightest stars in Perseus, the hero of Greek Mythology ("Mountain Skies", November-December 1999). Andromeda, awaiting rescue by Perseus, appears as a cornucopia opening downward with bright Alpheratz (AL-FEE-rats, the shoulder) at its apex, Almach (AL-mack, the desert lynx) at the end and Mirach (MY-rack, the girdle) and  $m$  (Mu) defining the middle and pointing to  $n$  (nu), which is within most binocular views of the Andromeda Galaxy.

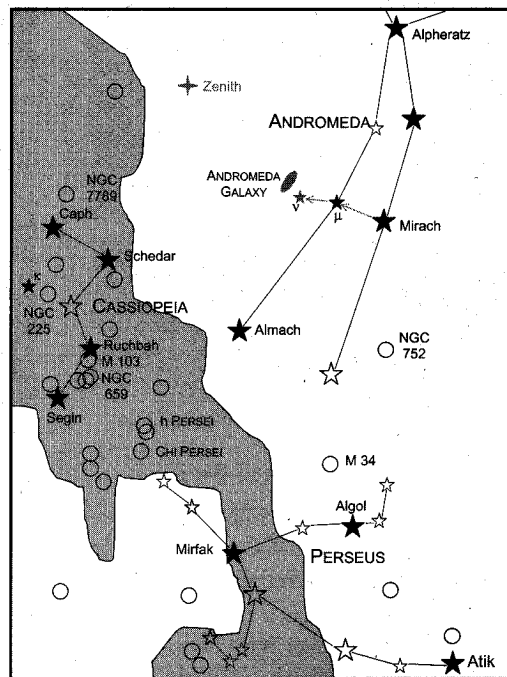


Diagram 2: Looking up from northeast horizon at 9 P.M. on November 1, 7 P.M. on December 1, and 6 P.M. on December 15.

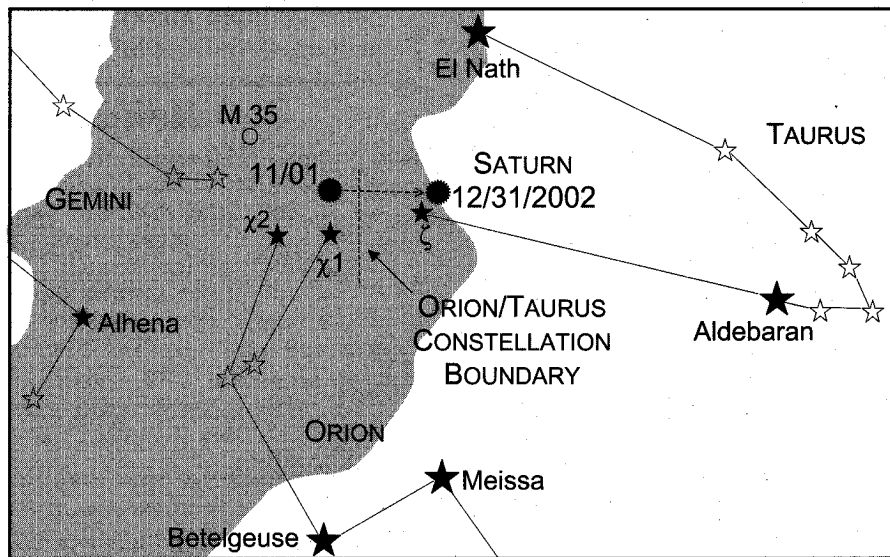


Diagram 1: the motion of Saturn between November 1 and December 31, 2002.

Andromeda's mother is Cassiopeia represented by the W of stars, Caph (KAFF, the hand), Schedar (SHED-are, the beast), Ruchbah (RUCK-buh, the knee), and Segin (SEE-gin).

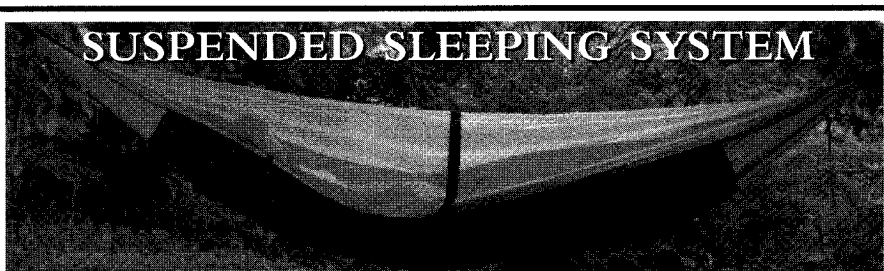
### A Billion Years Young

The Milky Way along Perseus and Cassiopeia is rich with open clusters of stars that can be seen with the aid of binoculars. Stars form from immense clouds of gas and dust that collapse under gravity. The clouds are so huge that they form not single stars, but clusters of stars that then slowly drift away from each other as they orbit the galaxy. Thus the open clusters are made up of relatively young stars (less than a billion years is "young" astronomically) still associated with their siblings. The Pleiades, which can be found by extending the arc from Mirfak to Atik, are about 100 million years old and a mere 400 light years (ly) from us (so the light has been traveling since the 17th century) in the Orion arm, the sun's neighborhood of our spiral galaxy. Represented by circles on Diagram 2, M34 and NGC 752 are also in the Orion arm, though more than 10 times more distant than the Pleiades. The other named open clusters range in distance from seven to 25 thousand light years and are in the neighboring Perseus spiral arm.

Wrapped in a warm blanket on a chaise lounge, a binocular tour of this region of the sky can take you across the universe from Caph, a mere 50 ly distant, past Algol and Alpheratz at 100 ly and the Pleiades and other stars at a few hundred ly, to the dark region between the Orion and Perseus spiral arms where stars are sparse. From there you can journey across the Perseus arm from NGC 225 on the near side to NGC 7789 on the far edge, in the outer reaches of our home galaxy. From there, leap across dark, intergalactic space to the combined fires of 400 billion stars in Andromeda galaxy, two million light years away.

However distant this seems, it is still little more than one hundredth of a percent of the size of the universe. Returning home to a winter night in the Adirondacks from such a journey can give us a fresh perspective on how near the other side of our tiny planet really is.

—Aileen O'Donoghue



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