

# ASTRAL PROJECTIONS

December 2011  
Volume 22 Issue 12

## Meeting Schedule

**December 9<sup>th</sup> Meeting: "Election of Club officers & Year End Awards" Presented by Ro Spedaliere**

Date: Friday, 12/9/2011

Time: 7:00 PM - 10:00 PM

Location: Robert J. Novins Planetarium, College Drive, Ocean County College, Toms River, NJ 08754

**January 13<sup>th</sup> Meeting: "Telescope Workshop"**

Date: Friday, 1/13/2012

Time: 7:00 PM - 10:00 PM

Location: Robert J. Novins Planetarium, College Drive, Ocean County College, Toms River, NJ 08754



### A look inside this issue:

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## *Mars Science Laboratory: NASA Launches Most Capable and Robust Rover to Red Planet*



*NASA's Mars Science Laboratory spacecraft, sealed inside its payload fairing atop the United Launch Alliance Atlas V rocket, clears the tower at Space Launch Complex 41 on Cape Canaveral Air Force Station in Florida. (Credit: NASA/Bill White)*

NASA began a historic voyage to Mars with the Nov. 26 launch of the Mars Science Laboratory, which carries a car-sized rover named Curiosity. Liftoff from Cape Canaveral Air Force Station aboard an Atlas V rocket occurred at 10:02 a.m. EST (7:02 a.m. PST).

"We are very excited about sending the world's most advanced scientific laboratory to Mars," NASA Administrator Charles Bolden said. "MSL will tell us critical things we need to know about Mars, and while it advances science, we'll be working on the capabilities for a human mission to the Red Planet and to other destinations where we've never been."

*(Continued on Page 3)*

# Whats up this month?

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**December 2011**

## **Celestial Events**

**2<sup>nd</sup>**: First Quarter Moon (4:52  
EDT)

**3<sup>rd</sup>**: Lunar Straight Wall  
Visible (18:00 EDT).

**10<sup>th</sup>**: Full Moon (9:36 EDT).

**14<sup>th</sup>**: Geminid Meteor Shower  
(13:00 EDT)

**17<sup>th</sup>**: Last Quarter Moon  
(19:48 EDT)

**22<sup>nd</sup>**: Winter Solstice (00:30  
EDT)

**24<sup>th</sup>**: New Moon (13:06 EDT)

**27<sup>th</sup>**: Two Shadows Transit on  
Jupiter (20:52 EDT)

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## **ASTRA Public Outreach & Star Parties Schedule for December**

### **Saint Barnabas Star Party**

Date: Saturday, 12/3/2011

Time: 5:00 PM - 9:30 PM

Location: Saint Barnabas Church, 33  
Woodland Road, Bayville, NJ 08721

**Check the online message board on the date of the star  
party for up to date information on these events.**



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The REFLECTOR is published in March, June, September and  
December. If you do not receive your copy of the  
REFLECTOR magazine, contact Astronomical League  
Coordinator (Alcor)  
Ro Spedalieri (Treasurer@astra-nj.org)

## **Astronomical Items for Sale, or Help Wanted Advertisements:**

If you have an item to Sell, or need help with an astronomical problem (a question, or Telescope setup) contact the President [President@astra-nj.org](mailto:President@astra-nj.org) to announce it at a meeting and send the advertisement to the newsletter (See Newsletter below).

**Newsletter:** E-mail material (Meeting reports, Observing reports) to [Newsletter@astra-nj.org](mailto:Newsletter@astra-nj.org)

## **EXECUTIVE BOARD**

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Check us out on Facebook, search groups for ( ASTRA Astronomy ) and look for our logo.



The mission will pioneer precision landing technology and a sky-crane touchdown to place Curiosity near the foot of a mountain inside Gale Crater on Aug. 6, 2012. During a nearly two-year prime mission after landing, the rover will investigate whether the region has ever offered conditions favorable for microbial life, including the chemical ingredients for life.

"The launch vehicle has given us a great injection into our trajectory, and we're on our way to Mars," said Mars Science Laboratory Project Manager Peter Theisinger of NASA's Jet Propulsion Laboratory in Pasadena, Calif. "The spacecraft is in communication, thermally stable and power positive."

The Atlas V initially lofted the spacecraft into Earth orbit and then, with a second burst from the vehicle's upper stage, pushed it out of Earth orbit into a 352-million-mile (567-million-kilometer) journey to Mars.

"Our first trajectory correction maneuver will be in about two weeks," Theisinger said. "We'll do instrument checkouts in the next several weeks and continue with thorough preparations for the landing on Mars and operations on the surface."

Curiosity's ambitious science goals are among the mission's many differences from earlier Mars rovers. It will use a drill and scoop at the end of its robotic arm to gather soil and powdered samples of rock interiors, then sieve and parcel out these samples into analytical laboratory instruments inside the rover. Curiosity carries 10 science instruments with a total mass 15 times as large as the science-instrument payloads on the Mars rovers Spirit and Opportunity. Some of the tools are the first of their kind on Mars, such as a laser-firing instrument for checking the elemental composition of rocks from a distance, and an X-ray diffraction instrument for definitive identification of minerals in powdered samples.

The mission's landing site offers Curiosity access for driving to layers of the mountain inside Gale Crater. Observations from orbit have identified clay and sulfate minerals in the lower layers, indicating a wet history.

*For more on this story, visit <http://www.sciencedaily.com>.*

*Science Daily, November 26, 2011*

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## ASTRA Library of Books & DVD's

The following books and DVD's are available to borrow for one month at a time. Request for these items must be made prior to our regular meeting and returned the following meeting. Please e-mail your request for these items to John Endreson at [President@astra-nj.org](mailto:President@astra-nj.org)

### BOOKS

1) **The National Air and Space Museum** Second Edition by C.D.B. Bryan

2) **Milestones of Aviation** Smithsonian Institution National Air and Space Museum

3) **New Atlas of the Moon** by Serge Brunier (Author), Thierry Legault (Photographer).

4) **Encyclopedia of space** by National Geographic

5) **The Real Mars** by Michael Hanion

### DVD's

1) **Parts 1&2 Understanding the Universe What's New in Astronomy 2003** Taught by: Professor Alex Filippenko. Each part has 8 lectures, 45 minutes per lecture.

2) **Parts 1 to 5 Understanding the Universe An Introduction to Astronomy** Taught by: Professor Alex Filippenko each part has 8 lectures, 45 minutes per lecture.

### 3) **COSMOS**

In his "ship of the imagination," Carl Sagan guides us to the farthest reaches of space and takes us back into the history of scientific inquiry in the course of 13 fascinating hours. For a complete list of books and DVD's, visit our website or e-mail John Endreson at [President@astra-nj.org](mailto:President@astra-nj.org)

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## Club Telescopes



A.S.T.R.A. owns four small telescopes

6-inch Dobsonian

8-inch Dobsonian

80mm Celestron Refractor

120mm EQ AstroView Refractor.

These telescopes are available for club members to borrow and use for a month or two at a time.

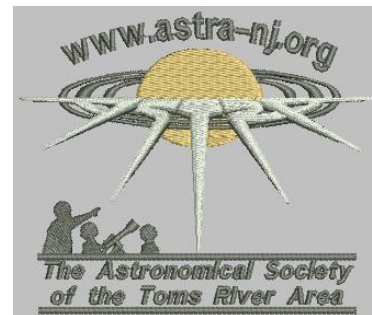
## Wanted!

No longer used telescopes, Telescope parts, and accessories.

E-mail John Endreson at [President@astra-nj.org](mailto:President@astra-nj.org)  
We will come and pick-up your used equipment.

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## ASTRA-WEAR: For Embroidered and/or Printed items With the ASTRA Logo



You can see some samples at ASTRA meetings. To order by mail: Shelter Cove Embroidery Co. 1333 Bay Ave Toms River, NJ 08753 call 732-506-7700 or E-mail [astra-wear@estitches.com](mailto:astra-wear@estitches.com)

# A Month of Moon watching

From our vantage point, the amount of the Moon's face illuminated by sunlight continually changes throughout its month-long orbit around Earth.

Some stargazers find the Moon an annoyance; its brightness makes it difficult to view faint nebulae, galaxies, and other "deep-sky" objects. But for me the Moon is forever an enchanted land, readily available even under less-than-ideal sky conditions. Whether presenting itself as a razor-thin slice or a circular orb lighting the night sky, the Moon always offers a visual feast. The interplay of shadows among the towering peaks and craters will appeal to your aesthetic interests and feed your curiosity. And its proximity allows even the most basic of astronomical instruments, the unaided eye, to explore some of the more prominent features.



Every 29 ½ days, as the Moon glides in its orbit around Earth, it steps through a complete cycle of its phases — from delicate crescent to fat disk and back again. Our month-long tour begins shortly after new Moon, which astronomers count as "Day 0" of the lunar month, and continues through first quarter (Day 7), full Moon (Day 14), and last quarter (Day 22). I've picked times when some of my favorite lunar features are prominently positioned near the *terminator*, the border between lunar day and night, where a low-angle Sun creates dramatic shadows that help define the shapes of craters and mountains and gives them a three-dimensional appearance.

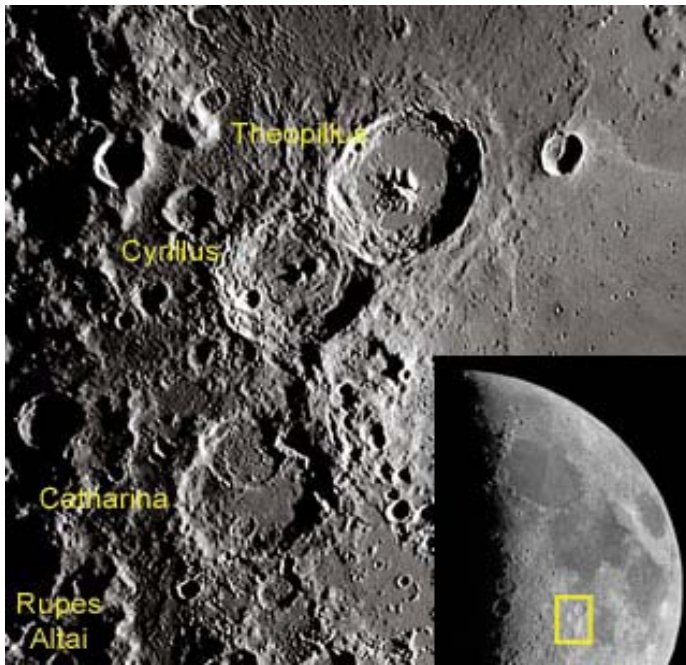
## Days 3 and 4



Few astronomical sights are more beautiful than a crescent Moon lingering in the evening twilight. The Moon is now waxing, or growing more fully illuminated, night by night. You'll often see a faint glow on the unlit side of the disk, next to the crescent. Sometimes called "the old Moon in the new Moon's arms," this *earthshine* is sunlight that has been reflected onto the lunar landscape by Earth and has bounced yet again back toward us. Under the right conditions, you might even be able to identify prominent lunar features within the area lit up by earthshine.

One of the most obvious features on the waxing crescent is Mare Crisium (Latin for "Sea of Crises"), an oval dark spot north of the lunar equator that's about 350 miles across. (It's just above center in the image at right.) I like to check Mare Crisium with each new lunar cycle. If you keep a close eye on it from month to month — or even over a few nights' time — you'll find that Mare Crisium moves toward or away from the edge of the lunar disk. Sometimes it's very close and appears more elongated than at other times. You can monitor this phenomenon with the unaided eye. This slight nodding of the disk, called *libration*, results from the not-quite-constant velocity of the Moon in its orbit and other geometrical factors.

## Days 5 and 6



Three prominent craters straddle the terminator on Day 5 — and they can be seen easily with binoculars. The first, Theophilus, is a 60-mile-wide ring that borders the shore of Mare Nectaris (Sea of Nectar). Through a telescope magnifying at about 80x, you should see a long, narrow shadow cast by the 4,600-foot-high cluster of mountain peaks at Theophilus's center. I like to use high power to try to distinguish individual peaks and explore the terraced inner walls of the crater.

Equal in size is the adjoining crater, Cyrillus. It's also ring-shaped, though part of its circumference has been breached by Theophilus. Tonight's shadows outline its rim, which to me appears slightly elongated in a north-south direction. The nearby crater Catharina is like-sized, but it lacks a central peak and its walls have partly disintegrated. Look for the mountain range Rupes Altai as it passes near Catharina's rim.

## Day 8

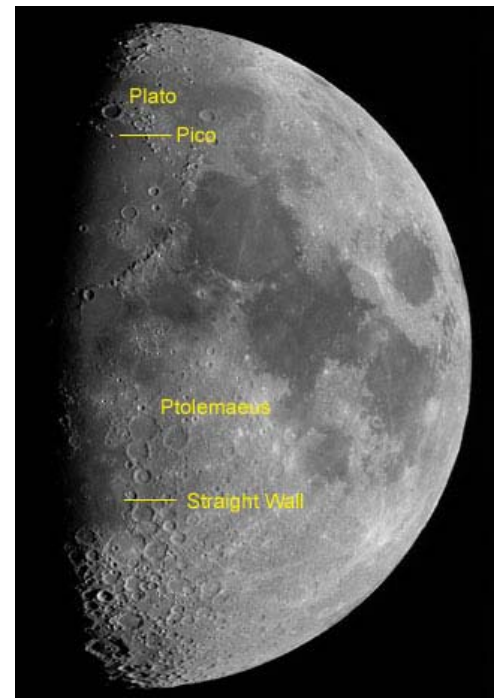
Some moongazers consider the date of first-quarter Moon (Day 7) to offer the most impressive lunar vistas. But waiting just one day later brings sunlight onto a few more dramatic features.



For example, Rupes Recta, the "[Straight Wall](#)," is 800 to 1,000 feet high. It's an easy find for a small telescope — look south-southeast of the prominent crater Ptolemaeus, which lies to the right of the terminator near the center of the Moon.

Although the Straight Wall might look like a steep cliff, it has a slope of only about 15°. Tonight this 80-mile-long feature appears as a thin, dark line — but 15 days from now it will look very different.

Now sweep to the northern edge of Mare Imbrium (Sea of Rains), where you'll find [Plato](#). This 60-mile-wide crater, sometimes likened to a "walled plain," has no central peak and a lava-filled floor that appears darker than its surroundings. It's truly circular, but it looks like an oval because of foreshortening at that far-northern latitude. In my 8-inch-aperture telescope at low power (40x), I see one wall cast in shadow and the opposite wall brightly lit. Try increasing the power to see if you can locate tiny craterlets on Plato's floor. Just to the south lies Pico, a solitary mountain roughly 10 by 15 miles in breadth that abruptly rises 7,900 feet above the surrounding terrain. The slopes aren't really all that steep, but at this time of the lunar cycle I see a long slender shadow cast by Pico, which gives me the impression of a towering mountain. Some observers think it looks like a cathedral spire. What does it look like to you?



## Day 9

Prominently splashed across the eastern half of Oceanus Procellarum (Ocean of Storms) is one of the Moon's grandest features. Copernicus, a spectacular 58-mile-wide crater, is distinguished by deeply terraced ramparts that rise 3,000 feet above the surrounding plain. The crater's interior has a broad, relatively flat floor with conspicuous central mountains.

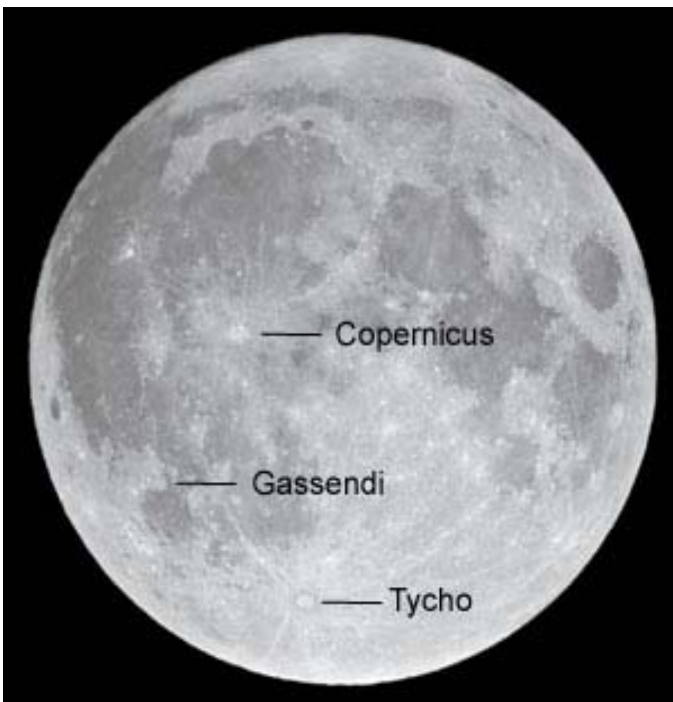
## Day 12

The Moon's disk is now gibbous, a rounded shape seen for several days before or after full Moon.

Tucked inside the northern side of Mare Humorum (Sea of Moisture) is the prominent flooded crater Gassendi. It spans almost 70 miles, has walls rising to 6,100 feet, and contains a number of central peaks. The central peaks are evident, but Gassendi has a gap in its southern wall, where the shadows go from black to light gray. A network of clefts, seen as thin streaks under high power, crisscrosses the crater floor. Some of these may be challenging to spot, depending on the size of your telescope and the steadiness of the atmosphere. Jutting into the northern rim is the craterlet Gassendi A. It's about a third the size of the main depression, yet its walls are almost twice as high. And while in the area, don't overlook the spectacular set of raised rilles that run across Mare Humorum's broad floor, on the side opposite Gassendi.



## Full Moon (Day 14)



When the Moon is bright and full, I find binoculars to be ideal for studying the rays that spray out like bright spokes from prominent lunar craters. Near the southern limb is Tycho, a 53-mile-wide crater that's the hub of the Moon's best ray system. Another set radiates from Copernicus. See if you can detect these ray systems with your eyes alone.

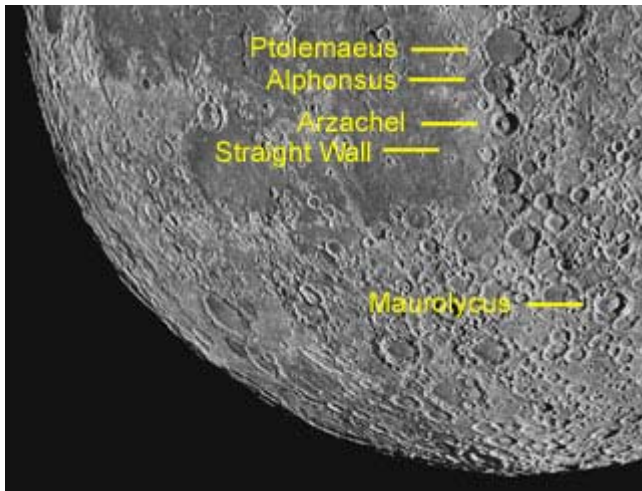
Because of the lack of shadows during a full Moon, it's a challenge trying to identify features that a few days ago were near the terminator, when shadows helped define their shape. However, the straight-on sunlight makes it possible to observe other characteristics in the landscape particularly well. For example, darker shadings become apparent in the maria — variations that are due to differing ages and compositions among these ancient volcanic flows. To me Tranquillitatis looks darker overall during full Moon than other maria do, and the eastern and southern shores of Serenitatis look darker than its interior. Check for yourself.

**Day 20**

The illuminated portion of the Moon has been *waning* (growing smaller) for several days now. During lunar sunset, Maurolycus, a large crater found in the rugged southern highlands, has an almost abstract appearance when seen in a telescope at low power. I'm struck by the central peak's shadow, which looks like a clock hand that nearly touches the outer edge of this 70-mile-wide depression. The crater walls, which in places soar 15,000 feet above the floor, are outlined in black.

**Day 22**

Many of the features seen in dramatic relief at first quarter are again visible along the terminator, except that the direction of sunlight has flipped. Northeast of Mare Nubium, the crater Ptolemaeus exhibits a hexagonal shape 95 miles across. Its stark walls are outlined in white, with shadows filling in the crater Herschel to its north.



Here's a good place to crank up the power on your telescope and search the floor of Ptolemaeus for small craterlets. Attached at its southern lip is the crater Alphonsus, which displays a 3,800-foot-high central peak and

walls that rise to twice that height. South of Alphonsus is another bold crater, Arzachel, with even higher ramparts. The interplay of light and dark creates a fascinating display — the central peak's shadow extends for half the crater's 60-mile diameter. In between Alphonsus and Arzachel, and less than half as big, look for Alpetragius. If you catch the sunlight just right, you'll see a half-dark interior sporting a white-tipped peak.

**Day 23**

By now the Moon doesn't rise until after midnight — so to do some lunar gazing you'll either have to stay up late or get up early. But it's worth it: if you're like me, you'll never get tired of seeing Rupes Recta, the Straight Wall. Tonight look for the thin white line of sunlight reflecting off its slope. The Moon offers stunning views like these every night as the terminator sweeps across the lunar landscape twice every month. I could only touch on some of my favorites here; you'll find others labeled on the map above. One thing's for sure: the Moon will seem different every time you look.

December 2011						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Moon calculations are based on your time zone. Check your computer time to ensure accuracy.  
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The Astronomical Society of the Toms River Area  
www.astronj.org

# Finding Your Way Among the Stars

Northern Hemisphere Version

*Here's how to use our bimonthly star charts to identify your evening stars and constellations.*

CAN YOU SPOT THE BIG DIPPER? Orion? The Pleiades? Your exploration of the universe begins with learning the stars in your evening sky. But different constellations are visible at different times of year and hours of the night, depending on your latitude and which way the night side of our planet is facing.

The accompanying charts will help you get oriented. They're designed for sky-watchers in midnorthern latitudes such as the United States, southern Canada, and Europe. Each represents the entire sky at the dates and times printed on it. Find a chart appropriate for your date, and go out within an hour or so of the time listed.

## How the Charts Work

The round edge of each chart represents your horizon, with compass directions labeled. Turn the map around so the edge marked with the direction you're facing (north, east, or whatever) is right-side up. The stars above this horizon on the map will now match the stars you're facing. Ignore the rest of the map for now.

The map's center is overhead (the zenith). So a star that's plotted halfway from the edge to the center can be found about halfway up the sky. That is, it will be halfway from horizontal to straight up.

Dot sizes indicate star brightnesses — the larger the dot, the brighter the star. Example: Let's try the July/August chart. Turn it so the horizon labeled "Facing West" is right-side up. About halfway from there to the center is the bright star Arcturus. Go outside around one of the dates and times listed, face west, and look halfway from horizontal to straight up. There's Arcturus!

To the right of Arcturus, in the northwest, is the Big Dipper. Turn the chart so the "Facing NW" horizon edge is right-side up. When you hold the chart correctly, the Dipper's handle stretches toward the upper left and its bowl is at lower right — just the way it looks in the northwestern sky. Nearly overhead, as you crane

your neck up, is the bright star Vega. It's part of the little constellation Lyra.

You'll notice that east is left of north on our charts, not to the right as on maps of the Earth. This is because the charts are used while looking up, not down.

## Tips for Success

Find a dark viewing site and bring a dim flashlight to read the map by. It's best to use red light, which helps preserve your night vision.

When you start out, look only for the brightest stars on the map, those depicted with the biggest dots. Mentally blank out the fainter ones if you are in a city or suburb (or in bright moonlight); they will be invisible or nearly so through the "light pollution." But wherever you are, remember that there is a much bigger difference between bright and faint stars in the sky than is suggested on the chart.

Remember that the chart is a very reduced representation of the real sky. To see how reduced, hold your hand at arm's length with your fingers fully spread as wide as you can. One of these "hand spans" from thumbtip to little fingertip is a little less than the length of the Big Dipper. Compare this with the size of the Dipper on the charts. You can work your way around by remembering this rule: One hand span in the sky is slightly less than an inch on the chart. Pretty tiny!

The maps are drawn for an observer at 40° north latitude (for example, Denver, New York, Madrid). If you're far south of there, stars in the southern part of the sky will appear higher than the map shows, and stars in the north will be lower. If you're far north of 40° latitude, the reverse will be true.

The Moon and planets are not plotted because they're always changing position. Find the line arcing across each chart labeled "ECLIPHTIC." This is the line near which the Sun, Moon, and planets always travel. It's called the ecliptic because it's where eclipses can occur.

If you see a bright "star" near the ecliptic that's not on the map, you've located a planet. To figure out which one it is, consult the latest issue of *Sky & Telescope* or visit [SkyandTelescope.com](http://SkyandTelescope.com) and use our Interactive Sky Chart.

## Looking Deeper

Take the maps out often, and try to learn a new constellation each night. You are establishing the landmarks you'll need for finding your way when you start using binoculars or a telescope.

Once you know at least some constellations fairly well, you can start exploring the sky a lot more deeply with optical aid. For this you'll need larger star charts that show more close-up detail.

The maps here show stars as faint as magnitude 4.5. This is about as faint as you can see with the naked eye through suburban light pollution. Also plotted are some interesting objects for binoculars or small telescopes: star clusters, nebulae, and galaxies. When hunting for these faint sights you'll have an easier time if you use larger charts that show stars to at least as faint as magnitude 6. (Higher magnitude numbers mean fainter stars.)

People who get serious about using a telescope will want even more detailed sky charts — ones that show stars as faint as magnitude 8 or so. *Sky Atlas 2000.0* by Wil Tirion and Roger W. Sinnott is the set most widely used. The latest edition shows 81,000 stars to magnitude 8.5 and 2,700 galaxies, star clusters, and nebulae.

Clear skies!

## Greek Letters on Star Maps

The brightest stars in each constellation are named with lowercase Greek letters. A constellation's most brilliant star is often called Alpha, the first letter in the Greek alphabet. The letters are used with the Latin genitive form of the constellation name, so the Alpha star of Centaurus is called "Alpha Centauri."

Here is the lowercase Greek alphabet as used by astronomers:

α Alpha	ι Iota	ρ Rho
β Beta	κ Kappa	σ Sigma
γ Gamma	λ Lambda	τ Tau
δ Delta	μ Mu	υ Upsilon
ε Epsilon	ν Nu	φ Phi
ζ Zeta	ξ Xi	χ Chi
η Eta	ο Omicron	ψ Psi
θ Theta	π Pi	ω Omega



# Evening Stars in Nov/Dec

Every issue of *Sky & Telescope* magazine contains a full-color star chart for the current month.

## Northern Hemisphere for latitude 40° N.

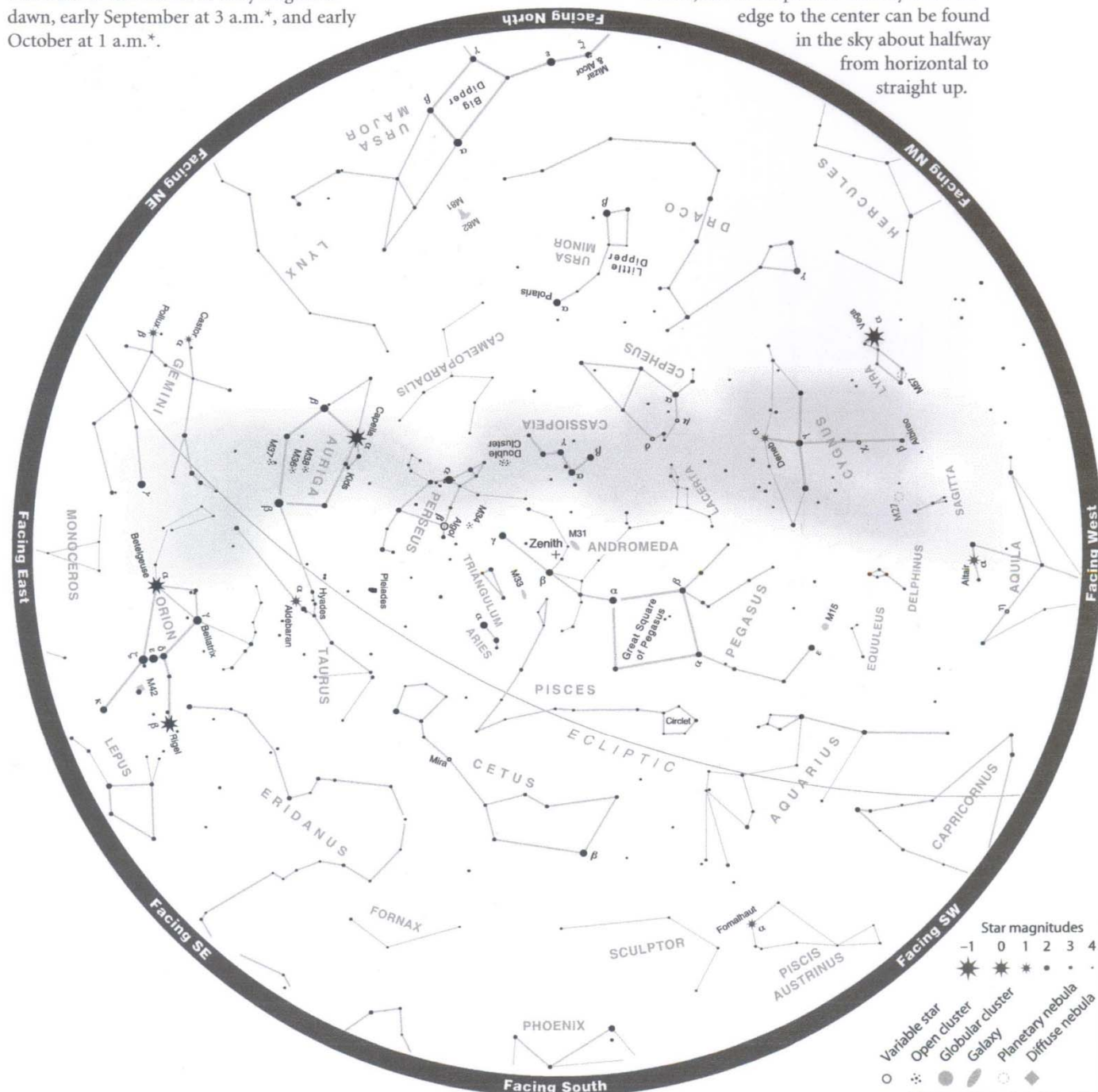
### When to Use This Chart

Early Nov.	10 p.m.
Late Nov.	9 p.m.
Early Dec.	8 p.m.
Late Dec.	7 p.m.

The chart is also useful in early August at dawn, early September at 3 a.m.\*, and early October at 1 a.m.\*.

### How to Use This Chart

Go out within an hour or so of the time listed at left. Turn the chart around so the edge marked with the direction you're facing is right-reading. The stars above this horizon on the map now match the stars in front of you. The map's center is overhead (the zenith). So a star plotted halfway from the edge to the center can be found in the sky about halfway from horizontal to straight up.



Star magnitudes  
-1 0 1 2 3 4

- Variable star
- ⊙ Open cluster
- ⊙ Globular cluster
- ⊙ Galaxy
- ⊙ Planetary nebula
- ⊙ Diffuse nebula