

StarDate™

FACT & FALLACY
BUSTING COSMIC MYTHS

JANUARY/FEBRUARY 2012

\$5



StarDate

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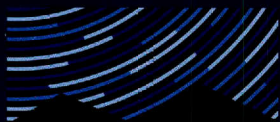
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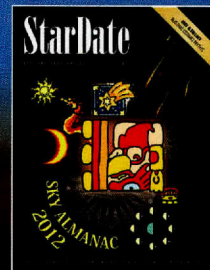
- SKY CALENDAR JANUARY/FEBRUARY** 28
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This Page

A whisker-thin crescent Moon hangs above the glow of Earth's atmosphere in a 2011 view from the International Space Station.

Coming Up in March/April

Astronomer and historian Barbara Ryden celebrates the centennial of a discovery that revolutionized how astronomers measure cosmic distance. We'll also talk about how joining a local astronomy club can enhance your skywatching fun and skills.



TIM JONES

On the Cover

From Sun- and Moon-eating dragons to Mayan prophecies, we tackle a few persistent astronomical myths and a lot of paranoid nonsense throughout this year's guide to the skies.



As astronomer Percival Lowell studied Mars through the eyepieces of his telescopes in the 1890s and beyond, he saw clear evidence of an ancient civilization: a network of straight lines that he interpreted as canals, carved by a dying race to carry water from the planet's poles to its deserts. Most other astronomers said Lowell's evidence was flimsy, and his interpretation pure twaddle, but the canals of Mars took hold in popular culture. The myth persisted until the Space Age, when the first probes to visit the planet found a dead, desolate world — but no canals. ☀️ Yet myth dies not quietly. The same probes that vanquished the canals brought us instead the Face — a small hill that, in low-quality pictures from orbit, resembled a human face. Better pictures showed that it's simply an eroded hill, but the myth persists that we have evidence of intelligent life on Mars. ☀️ Astronomy and space exploration abound with persistent myths and fallacies. Some are irritating but harmless, like the idea that, in late August (of any year), Mars will suddenly look as big as the full Moon. Others are more insidious because people use them to guide their lives. ☀️ Despite efforts to debunk them, many of these myths will persist, with many more joining them in the years ahead. And in a way, that's a puzzler. In a universe populated by pulsars and quasars, black holes and dark matter, planets assembled from the debris of exploded stars, and many other wonders, you don't have to look far to find the truly amazing — science fact that's far more compelling than science myth.

2012 SKY ALMANAC

Text by Damond Benningfield
Illustrations by Tim Jones and C.J. Duncan



OVERVIEW

Venus, Jupiter, and Mars — three of our four closest planetary neighbors — adorn the evening sky as the new year breaks. Venus is the dazzling “evening star” in the west at sunset, with only slightly fainter Jupiter high in the south at the same hour. Orange Mars rises by around 11 p.m. as January opens, but about two hours earlier at month’s end.

HIGHLIGHTS

2 The giant planet Jupiter cozies close to the Moon this evening. Jupiter is the brilliant “star” below the Moon at nightfall. They set in late evening.

3 The Quadrantid meteor shower is at its peak. (See chart, page 11.)

4 Earth is at perihelion, its closest approach to the Sun for the year, at a distance of about 91.5 million miles (147 million km), or about 1.5 million miles (2.4 million km) closer than average.

12/13 Mars, which looks like a bright orange star, stands well to the lower left of the Moon as they rise in late evening on the 12th, and a little closer to the upper left of the Moon on the 13th.

FEATURED EVENT

16 The star Spica stands just above the Moon as they rise around 1 a.m., with the slightly brighter planet Saturn a little farther to the left of the Moon.

24 Mars is stationary, which means that it appears to stand still against the background of stars. It actually is moving forward in its orbit at its normal speed, but the relative motions of Mars and Earth make the planet appear to stand still.

25/26 Venus, the dazzling “evening star,” is to the upper left of the Moon on the evening of the 25th, and closer to the lower left of the Moon the following evening.

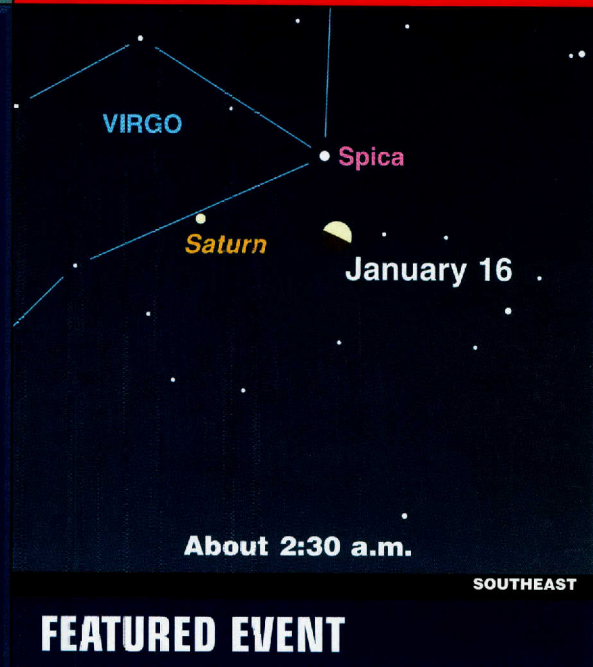
29/30 Jupiter, the solar system’s largest planet, is close to the left of the Moon at nightfall on the 29th, and to the lower right of the Moon on the 30th.

JANUARY

Su	M	T	W	Th	F	Sa
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				

JANUARY

Named for Janus, the Roman god of gates and doors, beginnings and endings



FEATURED EVENT

Chilly Morning View

If you’ve been following the planet Saturn over the last couple of years, you might almost think it has a crush on Spica, the brightest star of Virgo. It’s been lingering within the constellation’s borders since late 2009, advancing on the star slowly, as though working up its courage. Saturn passed especially close to the star late last year, and will remain nearby for most of 2012.

Saturn and Spica put on an especially pretty display on the morning of January 16, when the last-quarter Moon joins them. They rise in the wee hours of the morning and stand well up in the southern sky at first light.

Saturn has lingered near Spica for so long because it is the farthest of the five planets that are easily visible to the unaided eye, at an average distance from the Sun of close to 900 million miles (1.4 billion km). At that range, the giant planet requires about 30 years to complete a single orbit around the Sun, so it also takes that long to make one full circuit against the background of stars.

At that pace, Saturn takes an average of about 2.5 years to cross each of the 12 official constellations of the zodiac. Virgo is large, so Saturn actually spends a little longer inside its borders. And since Spica is by far Virgo’s leading light, Saturn appears to hover close to the star for years at a time.

By the end of 2012, though, Saturn finally will move on, into the neighboring constellation Libra. It’ll return for a few months next year, then it’ll leave Virgo behind once more — not to return until 2038.

FEATURED MYTH

The seasons are caused by the changing distance to the Sun

The distance from Earth to the Sun varies by about three million miles (5 million km) because Earth's orbit is an ellipse, which looks like a slightly flattened circle. The Sun is a bit off the center of the ellipse.

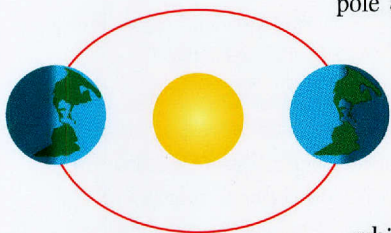
Perhaps it's a bit surprising to learn, then, that Earth is actually closest to the Sun in early January, when it is the dead of winter in the northern hemisphere.

The change in distance does affect how much energy we receive from the Sun — about six percent more when we're closest to the Sun, in January, than when we're farthest, in July. Earth's oceans and atmosphere are quite efficient at storing and distributing heat, however, so they keep the planet's overall temperature about the same year 'round.

The seasons are caused by Earth's tilt on its axis.

As Earth orbits the Sun, the north pole appears to "nod" up and down as viewed from the Sun. The north pole nods most directly toward the Sun at the June solstice, which is the beginning

of summer in the northern hemisphere. Six months later, however, as Earth moves half-way along its orbit, the north pole nods away from the Sun, so it's winter in the northern hemisphere and summer in the southern hemisphere.



MINI-MYTH

Dark Side of the Moon

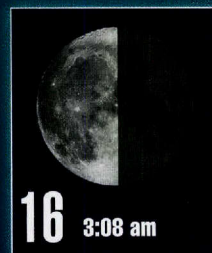
The Moon's rotation on its axis is synchronized with its orbit around Earth in such a way that the same lunar hemisphere always faces Earth. Scientists call the hemisphere that faces away from Earth the **farside**, although it sometimes is called the **dark side**. It sees the same cycle of day and night as the hemisphere the faces us, so in that respect it's no darker than the **nearside**. Until the Space Age, though, that hemisphere was completely unknown, which is one reason it's known as the dark side. Indeed, scientists use similar terms today to describe unknown particles and forces that make up most of the universe: *dark energy* and *dark matter*.



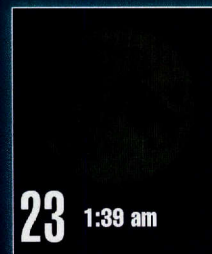
1 12:15 am



9 1:30 am



16 3:08 am



23 1:39 am



30 10:10 pm

Moon phase times are for the Central Time Zone.

The full Moon of January is known as the Old Moon, Moon After Yule, or Wolf Moon.

APOGEE

January 2

PERIGEE

January 17

ANNIVERSARIES

125 Years Ago

Meteorite hunter Harvey Nininger is born January 17, 1887. The colorful Nininger, a self-taught expert on space rocks, helped trigger a boom in research on meteorites and possible impact craters on Earth. He was a polarizing figure, though, whose detractors accused him of preferring collecting to science.



Nininger established this museum near Meteor Crater, Arizona, in the 1940s.

20 Years Ago

Penn State astronomers Alexander Wolszczan and Dale Frail announce the discovery of planets orbiting PSR B1257+12, a pulsar in the constellation Virgo, on January 8, 1992.

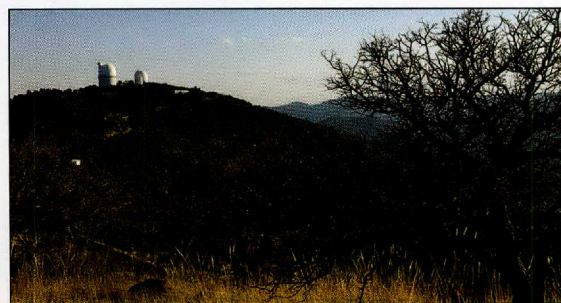


NASA/JPL-CALTECH/R. HURT (SSC)

Artist's concept of a planet and moon orbiting PSR B1257+12.

The pulsar is the remnant of a supernova explosion, suggesting that the planets formed from rubble that survived the blast. Two of the planets are a few times as massive as Earth, while a third is roughly the Moon's mass. All are closer to the pulsar than Earth is to the Sun.

EVENTS



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Year-Round

McDonald Observatory offers star parties every Tuesday, Friday, and Saturday night. Daily events include solar viewing and observatory tours, while other special events include lunar viewing and twilight programs. Prices and directions: mcdonaldobservatory.org.



OVERVIEW

The stars of winter reign through the long February nights. Orion is in the south at nightfall, with Sirius, the brightest star in the night sky, twinkling fiercely to its lower left. Venus reigns as the "evening star," although Jupiter gives it some competition in the evening sky. The two planets move closer to each other throughout the month. Mars is in the evening sky as well, climbing into good view in the east by around 9 p.m. early in the month, and by nightfall at month's end. Mars grows noticeably brighter during the month.

HIGHLIGHTS

- 7** Mercury is in superior conjunction, passing behind the Sun as seen from Earth, so it is hidden from view.
- 9** Venus passes by the faint giant Uranus, the third-largest planet in the solar system. Venus is the "evening star," with Uranus about one-half degree to its left. Uranus is visible through binoculars and looks like a faint star.
- 9** Mars is to the left or upper left of the Moon as they climb skyward this evening, and looks like a bright orange star.
- 12** Spica, the brightest star of Virgo, is close to the lower left of the Moon as they climb into good view in the wee hours of the morning, with the brighter planet Saturn farther to the lower left of Spica.
- 15** Antares, the brightest star of Scorpius, huddles below the Moon at first light.

FEATURED EVENT

24-26 The Moon cozies up to the second- and third-brightest objects in the night sky: Venus on the 24th and 25th, and Jupiter on the 26th.

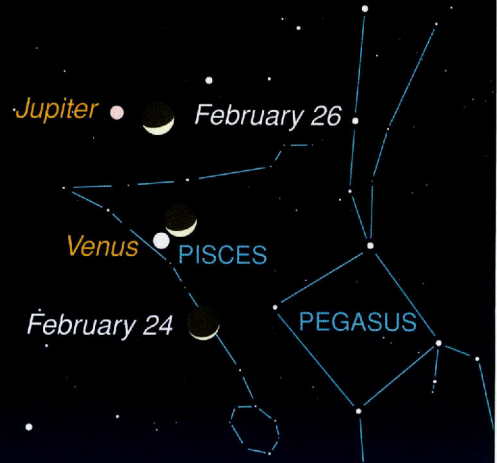
28 The dipper-shaped Pleiades star cluster, the "shoulder" of Taurus, the bull, is to the upper right of the Moon this evening. Aldebaran, the bull's orange "eye," is farther to the Moon's upper left.

29 Today is Leap Day, an extra day added to (almost) every fourth February to keep the calendar closely aligned with the true seasons.

FEBRUARY

Su	M	T	W	Th	F	Sa
			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			

FEBRUARY



FEATURED EVENT

The Gang's All Here

February is a great time for planet-watching this year, especially during the last third of the month, when five planets are in view at the same time, during early evening. Mars is low in the east, Mercury is low in the west, and Uranus, which is visible through binoculars, is a little higher in the west. (Saturn, the only other planet visible to the unaided eye, climbs into view in the wee hours of the morning.)

The champions of the show, however, are Venus and Jupiter, which are well up in the west at nightfall. You won't need directions to find them because they are the second- and third-brightest objects in the night sky, after the Moon. Venus is the dazzling "evening star" and Jupiter is only slightly less brilliant.

The show gets even better on the nights of the 24th through 26th, when the crescent Moon climbs past them. It is closest to Venus on the night of the 25th and Jupiter on the 26th.

As the February nights roll on, Jupiter and Venus will move closer together. By month's end, they will be separated by a bit more than the width of your fist held at arm's length. And as February gives way to March they will move even closer to each other, with Venus moving past Jupiter on the evening of March 12.

Naked-Eye Planets	
Venus	The brilliant morning or evening star
Jupiter	The largest planet in the solar system
Mars	Shines brightest this year in March
Mercury	Best this year in the dawn sky in April
Saturn	Shines brightest this year in April
Uranus	Requires very dark skies and good eyes

Ranked in order of maximum brightness when not too near the Sun for viewing

Named for Februus, the Roman god of purification

FEATURED MYTH

The phases of the Moon are caused by Earth's shadow

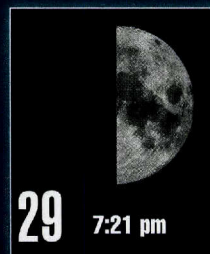
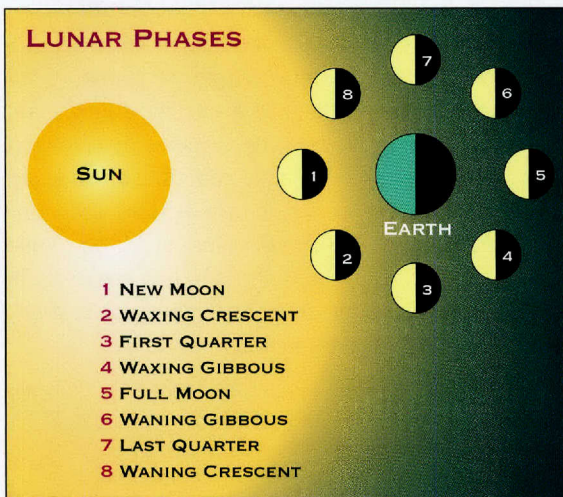
The phases of the Moon are indeed caused by a shadow, but not Earth's. Instead, the shadow is cast by the Moon itself as it circles Earth during its 29.5-day cycle of phases.

The cycle begins at "new" Moon, when the Moon crosses the line between Earth and the Sun. The Moon is lost from view in the Sun's glare for a couple of days, but it soon climbs into view in the early evening sky as a thin crescent. The crescent is illuminated by sunlight, while the dark portion of the lunar disk is immersed in the Moon's own shadow. To put it another way, it's nighttime on that portion of the Moon.

When the Moon is new or a thin crescent, Earth's shadow is aiming almost directly away from the Moon, so it has no effect on the Moon at all. (Instead, Earth casts a ghostly light on the Moon through an effect called earthshine, which is sunlight reflected off the surface of Earth.)

Over the following two weeks, the illuminated fraction of the Moon increases until the Moon is full, which occurs when it lines up opposite the Sun in our sky. After that, the Moon "wanes" from night to night, with the illuminated fraction growing smaller by the day. The Moon then once again disappears in the Sun's glare, beginning a new cycle of phases.

Earth's shadow does occasionally touch the Moon, but only two or three times a year, when the Moon's orbit crosses the shadow at the time of full Moon. This shadow play is known as a lunar eclipse.



Moon phase times are for the Central Time Zone.

The full Moon of February is known as the Snow Moon, Wolf Moon, or Hunger Moon.

PERIGEE
February 11

APOGEE
February 27

Apogee is the Moon's greatest distance from Earth, perigee is the smallest. The average distance is 239,000 miles (383,000 km), but the distance can vary by almost 30,000 miles (48,000 km).

ANNIVERSARIES

50 Years Ago

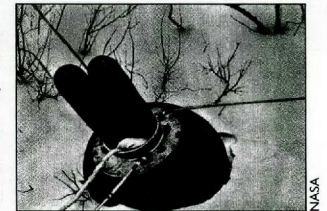
John Glenn becomes the first American to orbit Earth when he blasts off aboard his Mercury capsule, Friendship 7, on February 20, 1962. After his five-hour flight Glenn



John Glenn boards Friendship 7 becomes a national hero. He eventually returns to orbit aboard a space shuttle.

40 Years Ago

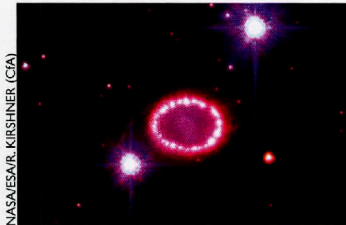
An unmanned Soviet capsule returns to Earth carrying about 1.5 ounces of soil from the Moon's Sea of Fertility on February 25, 1972. Luna 20 was the second of three Soviet missions to return lunar



The Luna 20 sample capsule landed in the snow.

25 Years Ago

The closest supernova to Earth in almost four centuries is discovered on February 24, 1987. Supernova 1987a, which is barely bright enough to see with the unaided eye, lies in the Large Magellanic Cloud, a companion galaxy to the Milky Way about 170,000 light-years away. It is by far the most extensively studied supernova in history; today, astronomers continue to keep an eye on its evolution.



Bright knots of material shine around the remnant of Supernova 1987a in this 2007 image from Hubble Space Telescope.

EVENTS

20-26 Winter Star Party
West Summerland Key, Florida

www.scas.org/wsp.html

22-26 Orange Blossom Special Star Party
Dade City, Florida

www.stpeteastronomyclub.org/obs.php



OVERVIEW

The planets dominate this month, particularly during the evening. As night falls, Venus and Jupiter shine forth in the west, the second- and third-brightest objects in the night sky after the Moon. Venus is below Jupiter as March begins, but climbs past it mid-month. While they dominate the west, Mars takes charge in the east. It rises around sunset and remains in the sky all night. It is brightest for the year, too, forming a brilliant orange beacon.

HIGHLIGHTS

FEATURED EVENT

3 Mars is at opposition, which means it lines up opposite the Sun in our sky. It puts in its best showing of the year.

5 Mercury is farthest from the Sun for its current evening appearance. It looks like a bright star low in the west as night begins to fall, and sets in early evening. It is well below brighter Jupiter and Venus.

FEATURED EVENT

6/7 The Moon, Mars, and Regulus team up. They are in the east in early evening and climb high across the sky later on.

7 Regulus, the brightest star of Leo, is to the upper left of the Moon at nightfall.

9/10 The Moon slides past the planet Saturn and the star Spica. As they rise on the night of the 9th, Spica is to the lower left of the Moon, with Saturn farther along the same line. The next night Saturn is to the upper left of the Moon, with Spica about the same distance above the Moon.

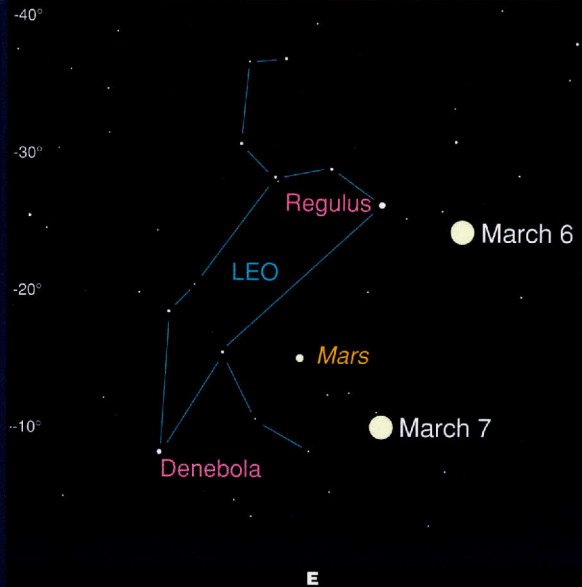
20 Spring begins with the vernal equinox at 12:14 a.m. CDT.

24-26 The crescent Moon climbs past Jupiter and Venus. The Moon is well below them on the 24th, just to the upper right of Jupiter on the 25th, and just to the upper left of Venus on the 26th.

MARCH

Su	M	T	W	Th	F	Sa
				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

MARCH



FEATURED EVENT

March (and Mars) Mayhem

Mars marches into March with a marvelous display. The planet is at opposition on March 3, when it lines up opposite the Sun in Earth's sky. It rises at sunset, climbs high across the sky during the night, and sets at sunrise. It passes closest to Earth around the time of opposition as well, so it is brightest for the year. It looks like a brilliant orange star, not far from Regulus, the brightest star of Leo, the lion.

The view gets even better on the nights of March 6 and 7, when the full Moon passes by.

Mars is named for the Roman god of war, who was adapted from the Greek god Ares. This martial name was inspired by the planet's reddish-orange color, which reminded ancient skywatchers of blood. The month of March also was named for the war god.

This is not a great opposition for Mars. Earth passes a bit more than 60 million miles from the planet, versus just 35 million miles a few years ago. The distance varies because Mars follows a much more elliptical orbit than Earth does, so its distance from the Sun varies by tens of millions of miles. When we pass Mars at this time of year, it's close to its farthest point to the Sun. When we pass it during summer, though, and especially in August, Mars is closer in, so it shines much brighter. (See the August pages for more.)

Even so, Mars is still a beautiful sight as it marches through the night skies of March.

Named for Mars, the Roman god of war

FEATURED MYTH

Planetary alignments cause earthquakes, tsunamis, cyclones, boils, hangnails, and other calamities

Every time two or more planets congregate close together in the night sky, fear mongers crank up the volume on their predictions of doom: The combined gravitational pull of the planets, they say, will cause earthquakes, alter the weather, or cause other catastrophes.

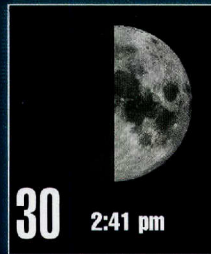
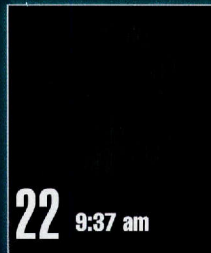
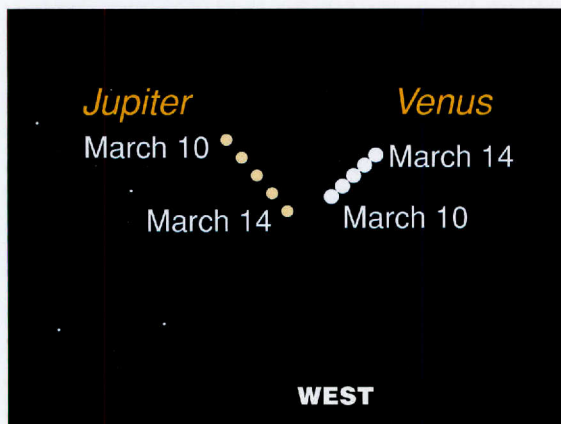
Baloney.

All of the planets are so small and far away that their gravitational effects on Earth are negligible.

Jupiter, the largest and heaviest planet in the solar system, is only one-tenth of one percent as massive as the Sun and, on average, it's about five times farther. When combined, those numbers tell us that Jupiter's gravitational tug on Earth is just 1/25,000th as strong as the Sun's. All of the other planets are less massive than Jupiter, and several of them are farther away, so their pull on Earth is even weaker. Even if you aligned all of them in the same direction from Earth, their combined pull would be insignificant.

In fact, planetary alignments are common. Two, three, four, or even five worlds frequently congregate fairly close together in the sky (which, of course, just means they are in the same direction as seen from Earth, not that they are physically close together). Yet none of these alignments has produced cataclysms like those predicted by the doomsday industry.

Instead, they have produced some of the most spectacular views in the night sky. This month, for example, Jupiter and Venus, the second- and third-brightest objects in the night sky after the Moon, pass by each other on the night of March 12. It will be a beautiful view — like a pair of headlights shining through the night.



Moon phase times are for the Central Time Zone.

Daylight Saving Time begins March 13

The full Moon of March is known as the Lenten Moon, Sap Moon, or Worm Moon.

PERIGEE
March 10

APOGEE
March 26

ANNIVERSARIES

100 Years Ago

Wernher von Braun is born March 23, 1912, in Germany. He was one of the founders of a German rocket society, which dreamed of sending men to the Moon and beyond. During World War II he led the development of the V-2, a Nazi terror weapon that was built with slave labor and that bombarded London and other Allied cities. At war's end, von Braun and many of his colleagues surrendered to the Americans, who soon put them to work. Von Braun headed a rocket development center in Alabama that built the booster that launched the first American satellite, as well as the giant Saturn V that launched Apollo astronauts to the Moon.

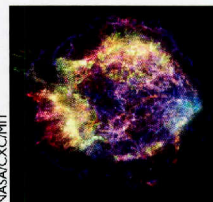


Von Braun in his NASA office, 1960

50 Years Ago

NASA launches the first of a series of Sun-watching satellites on March 7, 1962. Orbiting Solar Observatory 1 studied the Sun at high-energy wavelengths, from ultraviolet to gamma-rays, that are blocked by Earth's atmosphere. The craft also measures the background gamma-ray glow across much of the sky.

EXPLORATIONS



An X-ray view of Cassiopeia A, the debris from a supernova explosion

3 An X-ray observatory designed to conduct a census of black holes is scheduled for launch from a Pacific island. The Nuclear Spectroscopic Telescope Array (NuStar) also will look at "jets" of charged particles squirting away from supermassive black holes and study the radioactive debris from supernova explosions to learn how chemical elements are created and distributed by the blasts.

27 The Cassini spacecraft will make one of its closest approaches yet to Enceladus, an icy moon of Saturn, at a distance of 46 miles (74 km). The craft will study plumes of water that shoot into space from the moon's south pole. It also will photograph the Sun and Earth as they disappear behind Enceladus. Cassini will stage similar encounters with Enceladus in April and May.

EVENTS

3 **Tri-Star**
Jamestown, North Carolina www.gtcc.edu/observatory/tristar.aspx

22-25 **Mid-Atlantic Mirror Making**
Smyrna, Delaware www.delmarvastargazers.org

22-25 **Georgia Sky View**
Jackson, Georgia www.flintriverastronomy.org/GSV2012.htm



OVERVIEW

The constellation Taurus is especially prominent this month thanks to the Moon and the planet Venus. The bull is dropping toward the western horizon at nightfall, and soon will disappear from view. But Venus, the “evening star,” slides almost directly in front of its shoulder, the Pleiades star cluster, early in the month, and the crescent Moon passes between the Pleiades and the bull’s orange eye, the star Aldebaran, later on. In the meantime, Saturn puts in its best showing of the year, while Mars continues to shine for most of the night.

HIGHLIGHTS

FEATURED EVENT

2/3 Brilliant Venus, the “evening star,” slides past the Pleiades.

3 Bright orange Mars lines up to the upper left of the Moon at nightfall, with the star Regulus close to the upper right of Mars.

6 The Moon lines up with the star Spica and the planet Saturn. Spica is close to the left of the Moon at nightfall, with brighter Saturn farther to the left of Spica.

9 Venus and Aldebaran are in the west at sunset, with fainter Aldebaran about the width of a fist at arm’s length from brighter Venus.

15 Saturn, the second-largest planet in the solar system, is at its best for the year. It rises around sunset and shines all night in Virgo, with the constellation’s brightest star, Spica, to the right of Saturn. Saturn looks like a bright golden star.

22 Brilliant Jupiter, which is about to disappear in the Sun’s glare, stands directly below the Moon as evening twilight descends.

23 The crescent Moon passes through Taurus. The bull’s brightest star, Aldebaran, is to the upper left of the Moon, and its shoulder, the Pleiades star cluster, about the same distance to the lower right.

24 Evening-star Venus is to the upper right of the Moon this evening.

30 Venus shines brightest for its current evening appearance.

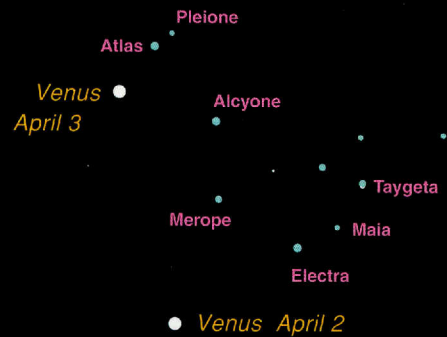
30 Orange Mars stands to the upper left of the Moon at nightfall, with the star Regulus closer to the upper right of the Moon.

APRIL

Su	M	T	W	Th	F	Sa
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					

APRIL

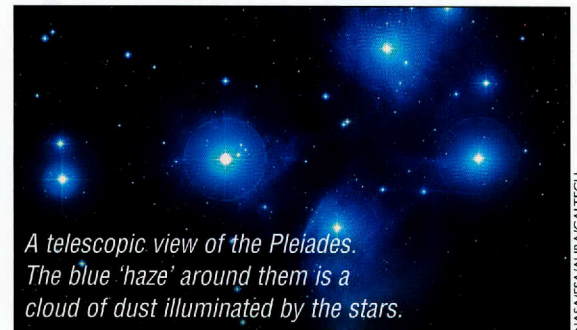
The Pleiades



FEATURED EVENT

Beauty Meets Beauty

Like characters in a fairy tale, the stars known as the Seven Sisters are the great beauties of a big family. The family consists of hundreds of sibling stars, most of which are so small and faint that you need a telescope to see them. A few are big and bright, however, so they are easy to see even though they are more than 400 light-years away.



A telescopic view of the Pleiades. The blue ‘haze’ around them is a cloud of dust illuminated by the stars.

NASA/ESA/AURA/CALTECH

The stars form M45, the Pleiades cluster, which looks like a tiny dipper. Early this month they share the spotlight in the western evening sky with another great beauty: the planet Venus, which dazzles as the “evening star.”

Although the stars of the Pleiades are known collectively as the Seven Sisters, only six of them are easily visible to the unaided eye, all of which are bigger, heavier, hotter, and brighter than the Sun.

Four of those stars are giants. They are nearing the ends of their lives, so they are undergoing changes that puff them up like giant balloons, making the stars much brighter.

Over the next few million years, the other two bright stars also will become giants. Eventually, all six stars will cast their outer layers into space, leaving only their hot but tiny cores, so the bright sisters will fade away. By then, though, some of the smaller stars in the cluster will begin entering their own giant phases. So just as in a fairy tale, the less-flashy siblings will someday outshine their showy sisters.

From the Latin name Aprilis, which may come from a word meaning “to open,” which describes the season in which trees and flowers begin to bloom, or from Aphrodite, the Greek goddess of love and beauty

FEATURED MYTH

Comets cause global cataclysms

As Comet Elenin sped into the inner solar system last year, doom-and-gloomers were almost giddy. Some forecast that the comet would slam into Earth, causing global destruction. Others claimed it would cause earthquakes and tsunamis (some even blamed the Japanese catastrophe on Elenin) or cause Earth's magnetic field to flip, crippling our electronics.

To quote an American general who refused to surrender to German forces during World War II, "Nuts to that."

Comets are balls of ice and rock no more than a few miles in diameter, so their influence on Earth, gravitational or otherwise, is insignificant. Yes, they could cause catastrophic damage if they hit Earth, but Elenin never got closer than about 20 million miles. (In fact, it disintegrated two months before its closest approach.) They can't cause earthquakes or tsunamis, and they have no effect on Earth's magnetic field.

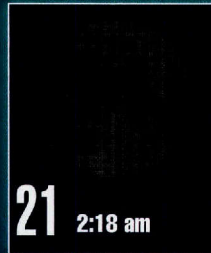
Crying "wolf" over comets is nothing new. Many cultures considered them omens of evil, portending the deaths of monarchs, the fall of nations, or the onset of plagues.

Even in more modern times, comets have remained convenient bogeymen. In 1910, Earth passed through the tail of Comet Halley. Astronomers had discovered traces of toxic compounds in the tail, so hucksters sold "comet pills" to a frightened public. And in 1997, scaremongers claimed that Comet Hale-Bopp would infect Earth with an incurable contagion.

We do see one effect from comets: meteor showers. As a comet approaches the Sun some of its ice vaporizes, releasing rocky debris. This material spreads out along the comet's orbit. If Earth passes through this path, some of the debris rains into the atmosphere as meteors — providing not horror, but beauty.

2012 Meteor Showers		
Shower	Peak	Moon
Quadrantids	Night of January 3	Sets after midnight
Lyrids	Night of April 21	New
Eta Aquarids	Night of May 5	Full
Perseids	Night of August 13	Morning crescent
Orionids	Night of October 21	First quarter
Leonids	Night of November 17	Evening crescent
Geminids	Night of December 13	New

These times are approximate; actual times may vary. The glare of a bright Moon makes it harder to see the meteors.



Moon phase times are for the Central Time Zone.

The full Moon of April is known as the Egg Moon or Grass Moon.

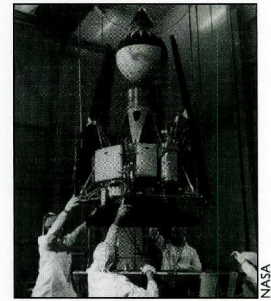
PERIGEE
April 7

APOGEE
April 22

ANNIVERSARIES

50 Years Ago

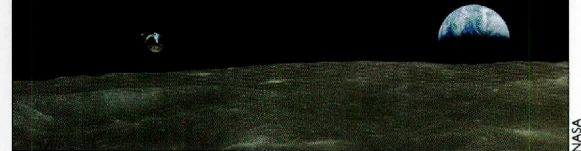
Ranger 4, the first American spacecraft to reach another astronomical body, crashes on the Moon on April 26, 1962. It was designed to photograph the lunar surface and land an instrument for measuring moonquakes, but a computer error left it without power. Even so, engineers tracked the probe to its crash landing 64 hours after launch. Earlier American lunar missions had completely missed the Moon.



Technicians prepare Ranger 4 for launch.

40 Years Ago

Astronauts John Young and Charles Duke land their Apollo 16 lunar module, Orion, on the Moon's Plains of Descartes on April 21, 1972. They spend three days on the surface and conduct three moonwalks before returning to crewmate Ken Mattingly in lunar orbit.



Earth and the Apollo 16 command module hover above the lunar surface.

EVENTS

15-22 Texas Star Party

Fort Davis, Texas

www.sjac.us/starparty.html

18-21 Mid-South Star Gaze

French Camp, Mississippi

www.rainwaterobservatory.org

20-22 Tennessee Spring Star Party

Spencer, Tennessee

www.cumberlandastronomicalsociety.org

28 Astronomy Day

A nationwide celebration of astronomy in which museums, astronomy clubs, libraries, universities, and many other groups host star parties, lectures, and other events for general audiences. Many events are held at shopping malls or other convenient locations.

www.astroleague.org/al/astroday/astroday.html

28-29 Northeast Astronomy Forum

Suffern, New York

www.rocklandastronomy.com/NEAF/index.html



OVERVIEW

The central event of the month, and one of the skywatching highlights of the year, takes place during the daytime: an annular eclipse of the Sun, which carves a narrow path across the western United States. After dark, some of the signature star patterns of summer begin their climb to prominence, including the Summer Triangle, which rises in late evening, and sinuous Scorpius, the scorpion, which is in full view at midnight by month's end.

HIGHLIGHTS

- 1** Mars looms far to the upper right of the Moon at nightfall, with the star Regulus to the right of Mars.
- 3/4** The Moon slips past Spica and Saturn. The pair is to the lower left of the Moon at nightfall on the 3rd, and above the Moon on the 4th. Saturn is the star-like point to the left, Spica to the right.
- 7** Antares, the orange "heart" of the scorpion, is to the left of the Moon at dawn.
- 13** Jupiter is in conjunction, passing behind the Sun and out of sight. It will return to view in the dawn sky by early June.

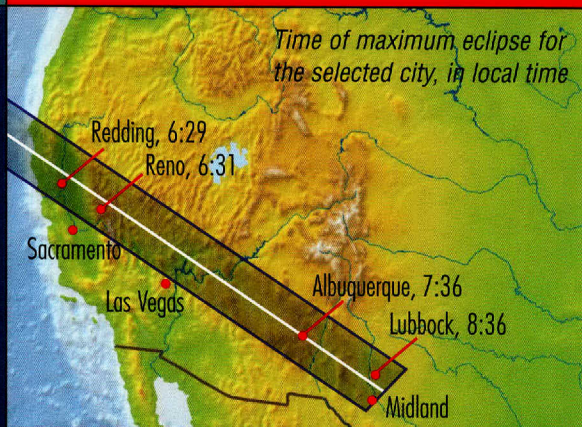
FEATURED EVENT

- 20** An annular eclipse of the Sun is visible from western North America.
- 22** Evening-star Venus is to the upper right of the Moon, quite low in the west at sunset. Both are near the tips of the horns of Taurus, the bull, with the star at the tip of left horn, Zeta Tauri, quite close to the Moon, and the right horn, El Nath, to the right of Venus.
- 27** Mercury is in superior conjunction, passing behind the Sun as seen from Earth.
- 28** Orange Mars is above the Moon at nightfall, with the star Regulus farther to the upper right of the Moon.
- 31** Spica huddles close to the Moon this evening, with the planet Saturn a little farther from the Moon, along the same line.

MAY

Su	M	T	W	Th	F	Sa
		1	2	3	4	5
6	7	8	9	10	11	12
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20	21	22	23	24	25	26
27	28	29	30	31		

MAY



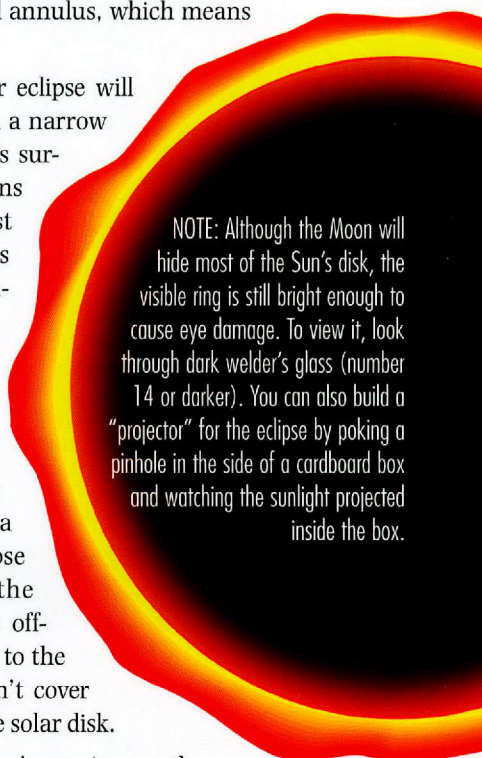
FEATURED EVENT

Ringin' Up an Eclipse

The Sun and Moon team up to produce a brilliant ring of fire across the western United States on the afternoon of May 20: an annular solar eclipse.

The eclipse occurs because the Moon passes directly between Earth and the Sun, covering the Sun's disk. The Moon will be near its farthest point from Earth then, however, so it isn't quite big enough to cover the entire disk. Instead, a thin ring of sunlight will encircle the Moon. The name "annular" comes from the Latin word annulus, which means "little ring."

The annular eclipse will be visible from a narrow strip of Earth's surface that begins in Southeast Asia, wraps across the Pacific Ocean, and ends in the western U.S. at sunset. Areas outside that strip will see a partial eclipse because the Moon will be off-center relative to the Sun, so it won't cover as much of the solar disk.



NOTE: Although the Moon will hide most of the Sun's disk, the visible ring is still bright enough to cause eye damage. To view it, look through dark welder's glass (number 14 or darker). You can also build a "projector" for the eclipse by poking a pinhole in the side of a cardboard box and watching the sunlight projected inside the box.

At the eclipse's maximum, the Moon will cover about 94 percent of the Sun's diameter, and the annular portion of the eclipse will last about five minutes, sandwiched between a partial eclipse. The eclipse may be especially beautiful near its end, over the Panhandle Plains of northwest Texas, because it occurs shortly before sunset, adding extra color to the spectacle.

Named for Maia, a goddess of spring from Italy before the time of the Roman Empire

FEATURED MYTH

A look at eclipse legends

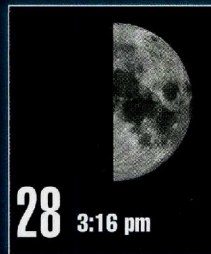
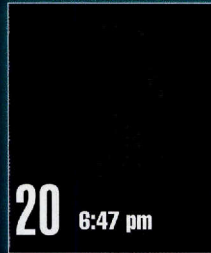
In Mark Twain's 1889 novel "A Connecticut Yankee in King Arthur's Court," a blow to the head transports Hartford native Hank Morgan to the court of Camelot. Because of his strange ways he is convicted of witchcraft and sentenced to burn at the stake. But crafty Morgan has a trick up his sleeve. He knows that the Moon is about to eclipse the Sun, so he warns King Arthur that he will blot out the Sun if he is not released. The king doesn't believe him and is ready to carry out the sentence when the sky turns dark. Morgan convinces the king it was all his doing, and agrees to bring back the Sun in exchange for his freedom.

Such is the fearsome power of a solar eclipse, one of the most spectacular — and frightening — events in nature.

Before careful observations of the motions of Sun and Moon allowed astronomers to predict them, eclipses seemed to be random events. The sky grew dusky, the air cool, then the Sun disappeared, replaced by a dark circle surrounded by a silvery glow.

In many cultures, a solar eclipse was seen as an attack on the Sun by a dragon or a demon. Some cultures shot arrows into the sky or banged drums to scare the demon away. And legend says that in some, royal or tribal skywatchers who failed to foresee such events (or to protect the Sun from attack) were executed.

Yet not all ancient cultures felt powerless against solar eclipses. Some developed the observational and mathematical skills to predict eclipses long before the rise of modern astronomy in Europe. The ancient Babylonians, Maya, and others made accurate eclipse predictions. Even with advance notice, though, their people often looked at eclipses with fear, as day briefly gave way to night.



Moon phase times are for the Central Time Zone.

The full Moon of May is known as the Milk Moon, Flower Moon, or Corn Moon.

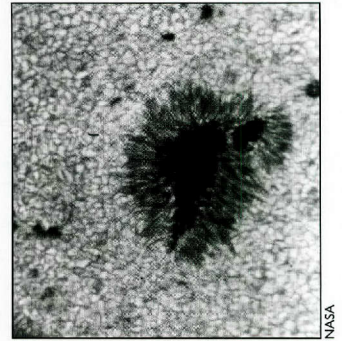
PERIGEE
May 5

APOGEE
May 19

ANNIVERSARIES

100 Years Ago

Before astronomers launched telescopes into space, they launched them high into the atmosphere with giant balloons. One of the pioneers in the field, Martin Schwarzschild, was born May 31, 1912. The son of an astronomer who made important contributions to the understanding of black holes, Schwarzschild headed the Stratoscope I and II projects beginning in the 1950s. High-altitude balloons carried telescopes for watching the Sun, planets, stars, and galaxies.



A Stratoscope view of a sunspot.

50 Years Ago

MIT scientists bounce a beam of light from the newly invented laser off the surface of the Moon and record the round-trip travel time on May 9, 1962. Called Project Luna See, it helps set the stage for more sophisticated lunar laser-ranging experiments as part of the Apollo Moon-landing missions.

EXPLORATIONS

19 Astronomers will be watching a small piece of the solar system as it swings about a half-million miles from Earth today. Asteroid 2010 KK37 will make the closest approach to Earth this year of any asteroid yet discovered. The chunk of rock, which is probably about the size of a small office building, was discovered in 2010, just two days after its last close approach to Earth. Although it will miss us by a wide margin, scientists will track it carefully to refine its orbit and determine if it could collide with Earth in the coming decades.

EVENTS

17-20 Two Rivers Spring Star Party
Barry, Illinois www.freewebs.com/tworiversstarparty

23-28 Riverside Telescope Makers Conference
Big Bear City, California www.rtmcastronomyexpo.org/general.html



OVERVIEW

Although the nights are shortest at this time of year, June is a big month for skywatching events. There's a slight lunar eclipse, plus, during the daytime, a rare transit of Venus across the Sun. Venus then climbs into view in the dawn sky by month's end, beginning its run as the "morning star," with Jupiter, which is second in brightness only to Venus, nearby. Mars moves closer to Saturn during the month as well. And in the stars, the scorpion skitters low across the south, and is in view all night.

HIGHLIGHTS

3 Mars and Regulus snuggle close. They are in the west at nightfall. Mars looks like a bright orange star. Regulus is to the lower left of Mars on the 6th, and directly below it on the 7th. They are separated by about the width of a finger held at arm's length.

4 A slight lunar eclipse is visible before sunrise today from most of the United States. Earth's dark inner shadow will take a small "bite" from the bottom of the Moon.

FEATURED EVENT

5 Venus will transit the face of the Sun late today.

16/17 The brilliant planet Jupiter is to the lower left of the Moon at dawn on the 16th, and just a degree or so to the right of the Moon on the 17th. They are quite low in the sky, so you need a clear horizon to spot them.

20 Summer arrives in the northern hemisphere at 6:09 p.m. CDT, which is the summer solstice.

21 The planet Mercury and the twin stars of Gemini, Pollux and Castor, line up to the upper right of the Moon shortly after sunset. Mercury is the brightest of the three.

25 Orange Mars is above the Moon at nightfall.

26 Mars stands to the upper right of the Moon at nightfall, with Spica and Saturn to the upper left of the Moon.

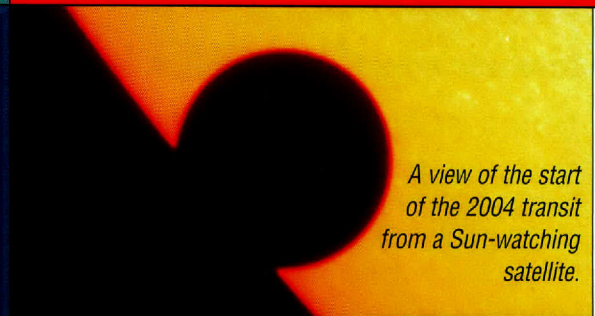
27 The star Spica is close to the upper left of the Moon this evening, with Saturn above Spica. Saturn has a slightly golden color, while Spica is blue-white.

JUNE

Su	M	T	W	Th	F	Sa
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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

JUNE

Named for Juno, the patron goddess of Rome and wife of Jupiter, king of the Roman gods



A view of the start of the 2004 transit from a Sun-watching satellite.

NASA

FEATURED EVENT

Taking A New Angle on the Solar System

A tiny black dot will creep across the face of the Sun on June 5: the planet Venus. It will take more than six hours to pass from one edge of the Sun to the other, with at least part of the crossing, known as a transit, visible from the entire United States.

Today, Venus transits have little scientific value. In the 18th and 19th centuries, however, they were highly anticipated by scientists.

The first transit ever predicted took place in 1639. Shortly before that, astronomers realized that they could use transits to measure the distance from Earth to Venus, which in turn would reveal the distance to the Sun and all the other bodies of the solar system.

To do so, they would watch the transit from several locations of precisely known latitude and longitude and compare the times at which Venus first and last touched the Sun. That would allow them to triangulate the positions of Earth, Sun, and Venus.

But it was a long wait for a chance to try it out. Transits occur in pairs, with a gap of eight years between the first transit and the second; this year's transit follows one in 2004, for example. The pairs, however, are separated by either 105.5 or 121.5 years. There were two transits in the 18th century, two in the 19th, and none in the 20th. So after the transit of 1639, the next one didn't come along until 1761.

Several practical problems made calculating the distances a tricky chore. Even so, by using the transits of the 18th and 19th centuries, astronomers were able to calculate the Earth-Sun distance to within a fraction of a percent of the true distance.

This year's transit begins a little after 5 p.m. CDT, when Venus first touches the solar disk, and ends 6 hours, 40 minutes later.

NOTE: Looking directly at the Sun can cause serious eye damage. To view the transit, look through dark welder's glass (No. 14 or darker), visit an observatory or planetarium that will display views through a solar telescope, or watch on the web or TV.

FEATURED MYTH

The positions of the Moon, planets, and stars affect our daily lives

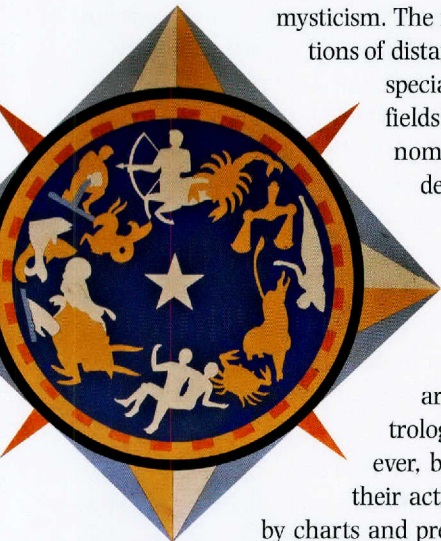
The planet Venus follows an unusual path this month, crossing directly in front of the Sun and blocking a bit of the Sun's light. This passage may well interrupt the daily routine for millions, as they take a break to watch it, either directly or through web or television broadcasts, and to marvel at the beauty and precision of the heavens. Otherwise, however, the positions of astronomical bodies have absolutely no effect on daily life.

Astrology sounds scientific because it is complicated and it uses many real objects in its calculations. Yet scientific investigation has demonstrated that there is no correlation between a person's date of birth (and the attendant relative positions of the Moon and planets) and his or her character or behavior.

Astronomical objects affect Earth only through their gravitational pull or their radiation. The Sun's gravity keeps Earth in orbit around it and bathes the planet in warmth and light. The Moon raises tides in the oceans and provides inspiration for poets and lovers. All other astronomical bodies are so far away that their gravitational attraction on Earth is insignificant, and their radiation — light, heat, X-rays, and so on — do no more than add beautiful decorations to the night sky.

Any other claimed effect is pure mysticism. The relative configurations of distant bodies create no special "psychic energy fields" or other phenomena that can be detected, tested, and verified. So the basic tenets of astrology are pure hokum.

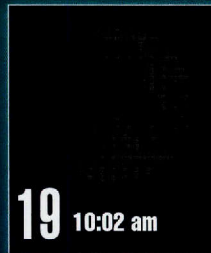
Many people are influenced by astrology indirectly, however, because they allow their actions to be dictated by charts and predictions of which days and events are "good" or "bad" for them. For these people, the beautiful objects in the night sky are more than sources of wonder and fascination — they are guiding lights.



4 6:12 am



11 5:41 am



19 10:02 am



26 10:30 pm

Moon phase times are for the Central Time Zone.

The full Moon of June is known as the Flower Moon, Strawberry Moon, Rose Moon, or Honey Moon.

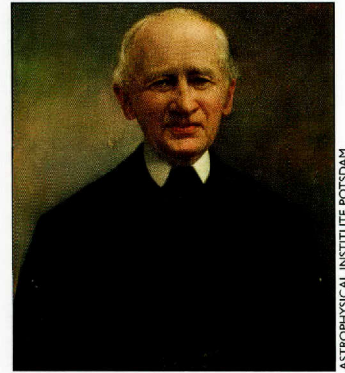
PERIGEE
June 3

APOGEE
June 15

ANNIVERSARIES

200 Years Ago

Johann Galle is born June 9, 1812, in Germany. In 1846, at the Berlin Observatory, Galle and Heinrich d'Arrest, discover the planet Neptune. They were looking in a region of the sky suggested by Urbain le Verrier, who had calculated the position of a possible planet based on discrepancies in the orbit of Uranus.



ASTROPHYSICAL INSTITUTE POTSDAM

EXPLORATIONS

Ongoing

In addition to the major milestones sprinkled throughout this issue, many spacecraft are continuing to explore the worlds of the solar system. Here are the leading examples

Mission	Target	Arrival
Venus Express	Venus	2006
Mars Odyssey	Mars	2001
Mars Express	Mars	2003
Opportunity Rover	Mars	2004
Mars Reconnaissance Orbiter	Mars	2006
Lunar Reconnaissance Orbiter	Moon	2009
Messenger	Mercury	2011

EVENTS

13-16 Rocky Mountain Star Stare
Gardner, Colorado

www.rmss.org

16-23 Grand Canyon Star Party
Grand Canyon, Arizona

www.tucsonastronomy.org/gcsp.html

20-23 Green Bank Star Quest
Green Bank, West Virginia

www.greenbankstarquest.org



OVERVIEW

This month is all about triplets. In the evening sky it's Mars, Saturn, and Spica, which are roughly the same brightness this month. They are in the southwest at nightfall and drop from view around midnight. The grouping is tightest at the end of the month. And in the morning sky it's Venus and Jupiter — the two brightest objects in the night sky after the Moon — and Aldebaran, the brightest star of Taurus. They are bunched most tightly in the first half of the month, and are in the east at first light.

HIGHLIGHTS

- 1** The planet Mercury stands farthest from the Sun for its current evening appearance. It is low in the west at nightfall, with the true star Regulus to its upper left.
- 4** Earth is at aphelion, its farthest point from the Sun for the year, about 1.5 million miles (2.4 million km) farther than the average distance of 93 million miles (150 million km).
- 9** Aldebaran, the brightest star of Taurus, stands less than a degree to the lower right of brilliant Venus in the dawn sky. Jupiter looms above them.
- 12** Venus is at its brightest for its current "morning-star" appearance.

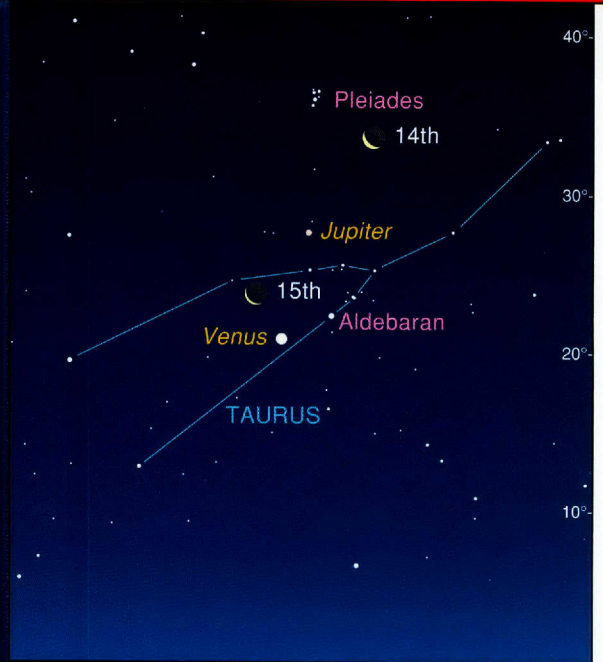
FEATURED EVENT

14/ 15 The crescent Moon teams up with Venus, Jupiter, and Aldebaran in the dawn sky.

24/ 25 The Moon passes by two planets and a bright star in the western evening sky. On the 24th, Mars is to the upper right of the Moon with Spica and Saturn to the upper left. Spica is lower in the sky. On the 25th, the Moon is to the left of the trio of bright pinpoints.

28 Antares, the eye of the scorpion, stands close to the lower right of the Moon at nightfall.

JULY



FEATURED EVENT

Flying Saucers on Final Approach

They're coming.

Phone calls. Tweets. Blog posts. Paranoia.

All over a pair of planets. Venus and Jupiter, the brightest objects in the night sky after the Moon, will pair up in the early morning sky this month. Each is responsible for many reports of UFOs, but when they appear close together, the numbers take off like an alien about to be caught by the Men in Black.

Venus is the brighter of the two worlds, shining as the brilliant "morning star," with Jupiter above it. They are in good view in the eastern sky at first light. The star Aldebaran, which represents the orange eye of Taurus, the bull, is close by as well. Venus and Jupiter are closest together early in the month, when as little as six or seven degrees will separate them — the width of about three fingers held at arm's length.

When you first see the two planets, you may think they are a pair of airplanes heading for a landing, with Jupiter second in the queue. If you keep an eye on them for a few minutes, though, it's clear that they're not moving.

And that's when the UFO calls start to pile up. To many, the two planets look too bright to be astronomical objects, particularly when they are paired. If you're driving the highway, they seem to be following you, no matter which way you turn. The conclusion is obvious: They must be alien spacecraft.

Obvious conclusions aren't always right, though. Fortunately or not, we're not being visited by aliens — just entertained by planets.

JULY

Su	M	T	W	Th	F	Sa
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				

Named for Julius Caesar

FEATURED MYTH

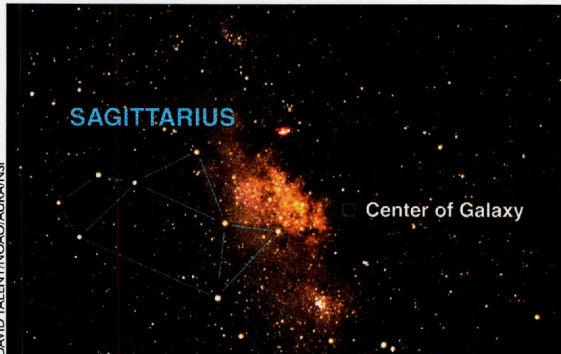
The Sun will become a black hole and swallow Earth; the solar system will fall into the black hole at the center of the galaxy

The Sun won't become a black hole because it is not massive enough. Instead, it will end its life as a white dwarf — a hot, dense ball only about as big as Earth, but containing about two-thirds of the Sun's original mass. Its outer layers of gas will blow off into space. Black holes are the fate of the most massive stars, which collapse when they exhaust the supplies of nuclear fuel in their cores and can no longer produce energy to counteract the pull of gravity.

Even if the Sun did become a black hole, its gravitational pull would be no different from that of the brightly shining star it is today, so there would be no change in Earth's orbit. A black hole's surface gravity is stronger than that of a normal star because all of its mass has been squeezed into an almost infinitely small point. But from comparable distances in space, you couldn't tell the difference between a black hole and any other object of the same mass.

The black hole at the center of the Milky Way is about four million times as massive as the Sun, so it exerts a strong gravitational pull. And over the eons, it will grow bigger as it ingests more stars, gas, and dust.

From our distance of about 27,000 light-years, however, the solar system won't be affected. Almost all of the matter that the black hole will ingest is already near the center of the galaxy. Some of that mass will become more concentrated, but we won't feel a difference. The Sun's orbit around the center of the galaxy will undergo changes as the Sun passes through clouds of interstellar gas and dust, or as it passes near star clusters, but it's unlikely that it will come anywhere near the galactic core.



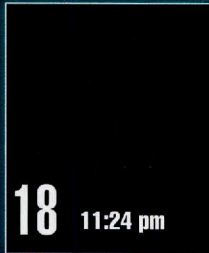
The Milky Way's central black hole is above the 'spout' of teapot-shaped Sagittarius, which scoots low across the south on summer nights.



3 1:52 pm



10 8:48 pm



18 11:24 pm



26 3:56 am

Moon phase times are for the Central Time Zone.

The full Moon of July is known as the Hay Moon or Thunder Moon.

PERIGEE
July 1

APOGEE
July 13

PERIGEE
July 29

ANNIVERSARIES

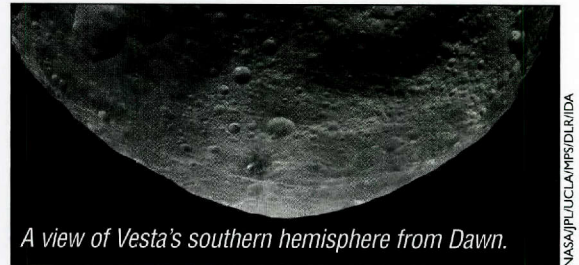
150 Years Ago

While studying the constellation Camelopardalis, American astronomer Lewis Swift discovers a comet on July 16, 1862. Three nights later, Horace Tuttle also sees it. The comet was named Swift-Tuttle to honor their co-discovery. Shortly after its discovery, astronomers found that its orbit corresponds to that of August's Perseid meteor shower. It was the first time a meteor shower had been linked to a comet, suggesting that meteor showers are caused by "comet dust."



A Perseid meteor, spawn of Swift-Tuttle, blazes through the upper atmosphere in this view from the International Space Station.

EXPLORATIONS



A view of Vesta's southern hemisphere from Dawn.

27 After a year studying the asteroid Vesta, the Dawn spacecraft will leave orbit and head toward the largest asteroid, Ceres. It will arrive at Ceres in 2015.

EVENTS

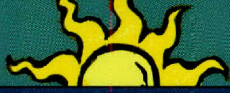
4-7 **Astronomical League Convention**
Chicago www.astroleague.org

14 **Southern California Astronomy Expo**
San Diego www.optscac.com/events/balboa

18-22 **Golden State Star Party**
Adin, California www.goldenstatestarparty.org

19-21 **Table Mountain Star Party**
Ellensburg, Washington www.tmspa.com

19-22 **Wisconsin Observers Weekend Party**
Waupaca, Wisconsin www.new-star.org



OVERVIEW

Multi-partner conjunctions continue to highlight summer's skies. Venus and Jupiter remain close together in the early morning, with some of the most famous features of Taurus nearby: his orange eye, Aldebaran, and his sparkly shoulder, the Pleiades star cluster. In the evening sky, Mars passes between Saturn and Spica, which have huddled close together all year. Two signature constellations of summer, Scorpius and Sagittarius, scoot low across the south during the evening. On dark, moonless nights, the shimmering band of the Milky Way arcs high overhead.

HIGHLIGHTS

- 2** Aldebaran, the eye of Taurus, the bull, snuggles close to the lower right of the brilliant planet Jupiter at first light.
- 11** Jupiter stands close to the lower left of the Moon at first light today, with Aldebaran farther to the lower right of the Moon.
- 13** Venus, the brilliant "morning star," stands just a few degrees below the crescent Moon at first light. The bright orange star to their right is Betelgeuse, at the shoulder of Orion, the hunter. Venus is nearing its highest point for its current morning appearance.
- 13** The Perseid meteor shower peaks tonight. At its best, under dark skies, you might see a score or so "shooting stars" per hour.
- 13/14** Mars shoots the narrow gap between the planet Saturn and the star Spica, low in the west-southwest. From bottom to top, they line up Spica-Mars-Saturn.
- 15** The planet Mercury is to the lower left of the Moon during early morning twilight and looks like a fairly bright star.
- 21** The Moon teams up with the tight bunching of Mars, Saturn, and Spica. Spica is close to the upper right of the Moon, with Saturn above Spica and Mars to the upper left of the Moon.
- 24** Antares, the heart of Scorpius, is just below the Moon at nightfall.

FEATURED EVENT

31 The Moon is full tonight. It is the second full Moon of the calendar month, making it a "blue" Moon.

AUGUST

Su	M	T	W	Th	F	Sa
			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	

AUGUST

Named for Augustus Caesar

FEATURED EVENT

Am I Blue?

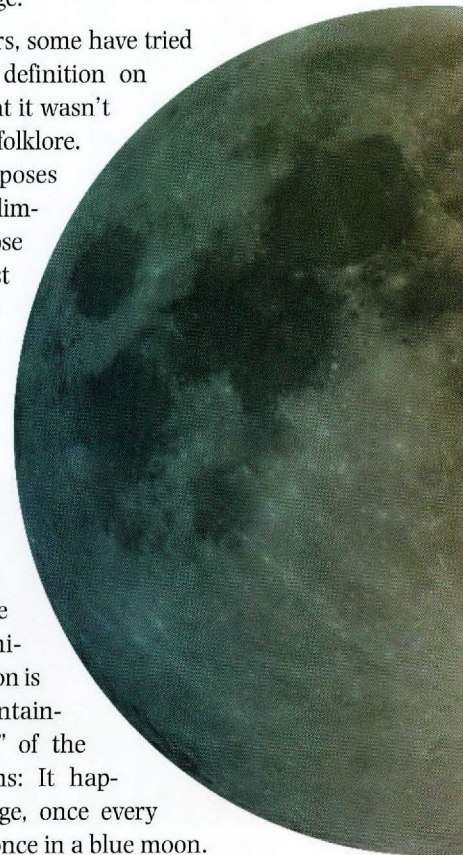
Folklore isn't always ancient. Consider, for example, the full Moon of August 31, which is the second full Moon of the month. According to folklore, that makes it a "Blue" Moon.

That bit of folklore, however, entered general usage only in the 1980s. Before that, it was simply a mistake.

"Blue moon" has had several meanings over the years. It can literally mean that the Moon looks blue, which can happen when certain types of smoke particles enter the upper atmosphere. It can also refer to the fourth full Moon in a three-month period or the 13th full Moon in a calendar year. All of these occurrences are rare, hence the phrase "once in a blue moon," meaning something that happens infrequently.

In 1943, however, *Sky & Telescope* magazine published an item that said an old almanac defined the blue moon as the second full Moon in a calendar month (which turned out to be incorrect). Decades later, Deborah Byrd, the original writer and producer of Star Date radio, discovered the article, and reported it on an episode of the show. Later, the board game Trivial Pursuit picked up the nugget. Soon, it was in widespread usage.

In recent years, some have tried to quash that definition on the grounds that it wasn't really from old folklore. Yet that supposes that folklore is limited to only those tales that exist today, with no more allowed. It overlooks the fact that "old" folklore was new at some point in the past, and it also ignores the reality that the modern definition of blue moon is fun while maintaining the "rarity" of the older definitions: It happens, on average, once every 27 months — once in a blue moon.



FEATURED MYTH

Mars will look as big as the full Moon this month

This may be the first enduring astronomical myth of the Internet age. Every August, emails, blog postings, Twitter messages, and other electronic communications report that Mars will suddenly get very close to Earth, making it look as big as the full Moon.

First, the facts. It's not so. Mars is low in the southwest at sunset this month, and looks like a modestly bright orange star. In mid-month, it passes between Spica and Saturn, with the Moon joining the trio on the 21st. It's a beautiful conjunction, but you won't have any difficulty telling the Moon and Mars apart.

The rumor originated in 2003, when Mars passed closest to Earth in about 60,000 years, at a distance of less than 35 million miles (56 million km) on August 27. The planet shone as brilliantly as Jupiter, the third-brightest object in the night sky after the Moon and Venus. It was an impressive sight.

An astronomy publication noted that, through a small telescope, it would look as large as the full Moon does to the unaided eye. Yet to the unaided eye, Mars itself would remain a star-like point of light. Unfortunately, the story got garbled, then it got disseminated, then it got to be a pain in the neck.

Now, the lecture. Not only is this rumor untrue, it makes no sense. During all of human history, Mars has never appeared larger than a star-like pinpoint. It makes no sense that it would, quite suddenly, go from that pinpoint to a Moon-size disk. It would have to jump from tens of millions of miles away to just a half-million miles to look that big. Barring some cosmic cataclysm, it will never pass that close to Earth. What's more, for it to make such a giant change in such a tiny time — questions about the rumor usually show up a few days before the "predicted" event — would defy every law of orbital motion.

So, please, think carefully before you pass along Internet rumors. They're usually not just wrong, they're silly.



1 10:27 pm



9 1:55 pm



17 10:54 pm



24 8:54 pm



31 8:58 pm

Moon phase times are for the Central Time Zone.

The full Moon of August is known as the Grain Moon or Green Corn Moon.

APOGEE
August 10

PERIGEE
August 23

ANNIVERSARIES

40 Years Ago

NASA launches the first large ultraviolet telescope into space on August 21, 1972. Copernicus operated for almost nine years, compiling a catalog of more than 500 sources.

35 Years Ago

One of the greatest voyages of discovery in history begins August 20, 1977, when NASA launches Voyager 2, the first of two missions to explore the giant planets of the outer solar system. (Its sister, Voyager 1, follows two weeks later.) Both Voyagers conducted extensive reconnaissance of Jupiter and Saturn, then Voyager 2 continued to Uranus and Neptune.



A Voyager transits the outer solar system.

EXPLORATIONS

3 The Curiosity rover, also known as Mars Science Laboratory, is scheduled to land in Gale Crater, a basin that shows signs of an ancient river delta and other evidence of water in the distant past. The nuclear-powered rover will use an on-board chemical laboratory and a rock-vaporizing laser to analyze the rocks and soil to determine if the region is or was habitable.

Sealed in a protective capsule, Curiosity approaches Mars in this artist's concept.

EVENTS

- 8-12 Mount Bachelor Star Party**
Bend, Oregon www.mbsp.org
- 15-19 Oregon Star Party**
Prineville, Oregon www.oregonstarparty.org
- 16-18 Weekend Under the Stars**
Fox Park, Wyoming home.bresnan.net/~curranm/wuts.html
- 16-19 Stellafane**
Springfield, Vermont stellafane.org/convention
- 16-19 Julian Starfest**
Julian, California www.julianstarfest.com
- 19-27 Hidden Hollow 2012**
Mansfield, Ohio www.wro.org/hiddenhollowinfo.html



OVERVIEW

This is a month of especially close encounters for the Moon. It just squeaks past Jupiter early in the month, takes aim at Venus a few days later, and finishes up with Mars after the Moon moves into the evening sky in mid-month. Scorpius and Sagittarius, the signature constellations of summer, are getting ready to drop from view, while a string of constellations representing water is climbing into view in the southeast.

HIGHLIGHTS

FEATURED EVENT

8 The Moon and Jupiter stage a spectacular encounter in the early morning sky, with the “face” of Taurus, the bull, looking on.

10 Mercury is in superior conjunction, which means it passes behind the Sun as seen from Earth.

12 The Moon and Venus highlight the dawn sky. Venus, the “morning star,” stands a little to the left of the Moon at first light

19 Mars is quite close to the left of the Moon as night falls this evening. They are low in the west-southwest. Mars looks like a moderately bright orange star.

20 Antares, the heart of Scorpius, is to the lower left of the Moon at nightfall. Mars is well to their right. The juxtaposition of Antares and Mars allows you to see the resemblance between the two bodies, which inspired the star’s name: Antares means “rival of Mars.”

22 The autumnal equinox is at 9:49 a.m. CDT, marking the beginning of autumn in the northern hemisphere.

29 Uranus, the third-largest planet in the solar system, is at opposition. It rises at sunset and is above the horizon all night. It is brightest for the year, too, yet you need binoculars to see it. Tonight, it is not far to the lower right of the Moon.

29 The Moon is full tonight. As the full Moon closest to the autumnal equinox, it is the Harvest Moon.

SEPTEMBER

Su	M	T	W	Th	F	Sa
						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						

SEPTEMBER

Name means ‘seventh month,’ from the time when the year began in March



FEATURED EVENT

Peek-A-Boo!

The Moon occasionally plays peek-a-boo with stars and planets. Before dawn on September 8, for example, it will pass in front of Jupiter, hiding the giant planet from view from southern South America. The viewing angle is different from the northern hemisphere, so we will miss the event, called an occultation, but will see a breathtakingly close encounter between the two.

Occultations can be illuminating events, revealing details about both the occulting body and the one that is covered.

When the Moon occults a star, for example, the length of time it takes for the star’s light to fade out reveals the star’s angular diameter. If astronomers know the star’s distance, they can then calculate its true diameter. They compare the diameter to models of stellar evolution that predict the size of a given type of star to ensure that the models are correct.

If a star is a tight binary — two stars that are so close together that they normally cannot be seen as individual stars — one star may “wink out” before the other, allowing astronomers to measure the distance between them and learn more details about each individual star. Occultations can also reveal if a star is actually a multi-star system, with three or more individual stars.

Planets and asteroids also can occult stars.

An occultation in 1977 revealed rings around Uranus, as the light of the distant star flickered several times both before and after it passed behind the giant planet. And just last year, astronomers were able to better measure the size and brightness of the dwarf planet Eris when it occulted a star. They found that Eris is almost exactly the same size as Pluto, and that it is one of the brightest objects in the solar system.

Asteroid occultations provide better estimates of the asteroid’s size and shape, which reveals more about its mass and density, helping planetary scientists determine its composition.

FEATURED MYTH

You can stand an egg on its end only on the (spring) equinox

This myth usually applies to the March equinox, which marks the beginning of spring in the northern hemisphere. However, the September equinox marks the beginning of spring in the southern hemisphere, so it will have to stand in. (Spring equinox may get the nod over fall because of its association with life and rebirth, which are well represented by the egg.)

Like most pseudoscience, this myth invokes a few scientific terms to give it a whiff of legitimacy. Unfortunately, though, throwing in words like “equinox” and “gravity” doesn’t cleanse the smell of rotten eggs.

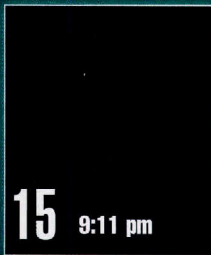
Here’s the basic outline of the myth: At the equinox, Earth’s axis is perpendicular to the line to the Sun (true), so there is a special gravitational “balance” that does not exist at other times of the year (false). This balance allows you to sit a raw egg on its end — a feat that cannot be achieved on any other date (stinky).

It may well be true that more eggs are balanced on end on the March equinox than at any other time of year, but only because more people give it a whirl then.

It is easy to disprove this myth yourself by trying to stand an egg on end on different days of the year. It’s not an easy task at any time because the egg’s interior is a fairly thick liquid, so it doesn’t want to sit still. But with a little patience (and perhaps a variety of eggs), it can be done. It’s easier to accomplish if the egg has a rough exterior and it’s on a rough surface, but many people have accomplished the feat with smooth eggs on glassy surfaces. Just keep trying, and eventually you’ll get the egg-exact formula.



8 8:15 am



15 9:11 pm



22 2:41 pm



29 10:19 pm

Moon phase times are for the Central Time Zone.

The full Moon of September is known as the Harvest Moon, Fruit Moon, or Corn Moon.

APOGEE
September 7

PERIGEE
September 18

EVENTS

8-16 Okie-Tex Star Party
Kenton, Oklahoma

www.okie-tex.com

14-15 Idaho Star Party
Bruneau, Idaho

isp.boiseastro.org

13-16 Great Lakes Star Gaze
Gladwin, Michigan

www.greatlakesstargaze.com

RESOURCES

Online

StarDate Online

Daily skywatching tips, lunar phases, guides for getting started, and other skywatching resources.

stardate.org



U.S. Naval Observatory

Custom sunrise/sunset and moonrise/moonset charts, eclipse information, rising and setting information for planets and bright stars, and other data for any location on Earth.

www.usno.navy.mil/USNO/astronomical-applications

SpaceWeather

Updates on solar flares, photo galleries of the latest meteor showers, news about major skywatching events, information on where to see the northern lights.

spaceweather.com

Meteor Shower Calendar

The International Meteor Organization provides star charts, explanations, and other details on meteor showers.

www.imo.net/calendar/2012

NASA Eclipse Web Site

Charts, tables, and much more on lunar and solar eclipses for 2012 and beyond.

eclipse.gsfc.nasa.gov

Radio

StarDate provides regular skywatching updates, research findings, and more about astronomy seven days a week.

stardate.org/radio

Publications

Observer’s Handbook 2012, edited by Patrick Kelly

A detailed look at upcoming astronomical events plus an extensive reference section.

rasc.ca/handbook

Astronomical Calendar 2012, by Guy Ottewell

An over-sized reference with detailed star charts, meteor shower details, planet viewing, and much more.

universalworkshop.com



OVERVIEW

With the nights getting longer and cooler, October is one of the best months for some skywatching. The evening sky offers such treats as Andromeda and her famous galaxy, M31, as well as several other constellations associated with her mythological story, and the Pleiades and Hyades star clusters in Taurus. Jupiter is dominating the evening sky, with Mars beginning to bow out. Venus rules the early mornings, passing almost over the top of the heart of the lion early in the month.

HIGHLIGHTS

2-4 Venus, the "morning star," inches past Regulus, the heart of Leo, in the early morning sky. They are closest on the morning of the third, separated by a fraction of a degree.

4/5 The brilliant planet Jupiter stands to the lower left of the Moon as they rise late on the evening of the 4th, and closer above the Moon on the 5th. Jupiter is stationary, so it shows no discernible back-and-forth motion across the background of stars.

11/12 Regulus is to the lower left of the Moon at first light on the 11th, with Venus well below them. Venus is close to the left of the Moon on the morning of the 12th.

FEATURED EVENT

17-18 The Moon sweeps past twin orange pinpoints — the planet Mars and the star Antares, whose name means "rival of Mars" — in the southwest in the early evening. Mars and Antares are to the left of the Moon on the 17th, and closer below it on the 18th.

25 Saturn is in conjunction, passing behind the Sun as seen from Earth.

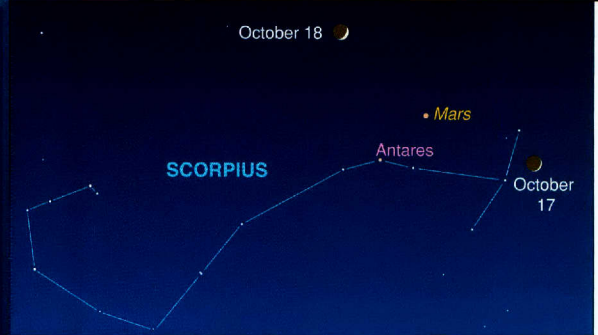
31 The Moon, Jupiter, and Taurus team up on this Halloween evening. The bull's shoulder, represented by the Pleiades star cluster, is above the Moon as they climb into good view, with his eye, the star Aldebaran, below the Moon. Brilliant Jupiter is to the left of Aldebaran.

OCTOBER

Su	M	T	W	Th	F	Sa
	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			

OCTOBER

Name means 'eighth month,' from the time when the year began in March



FEATURED EVENT

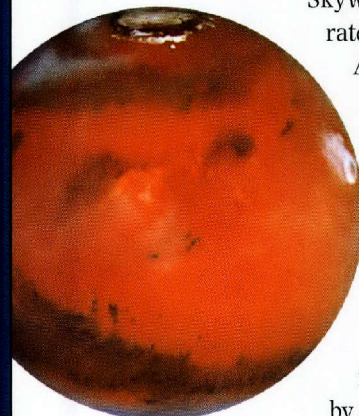
A Colorful Astronomical Rivalry

What's in a name? Keep an eye on the southwestern evening sky this month to find out. A pair of orange pinpoints move closer to each other as the month progresses, looking almost like twins. The Moon joins them on the nights of October 17 and 18, making it even easier to pick them out.

The best-known member of the pair is the planet Mars. It's also known as the Red Planet, although that's a bit of a misnomer, because its color is decidedly orange. It's one of the reddest-looking objects in the night sky, though, and at its brightest it far outshines all the others. That brilliant orange countenance reminded the cultures of the ancient Mediterranean of blood, so the planet was named for the god of war. In Greece he was known as Ares; in Rome, Mars.

Like all the planets, Mars circles through the background of distant stars, completing a circuit every couple of years. This motion earned Mars and its fellow worlds the name "planet," which comes from a Greek word meaning "wanderer."

During each loop through the sky, Mars passes the bright orange star at the heart of Scorpius, the scorpion. (This year Mars will skim within the width of two fingers at arm's length of the star, with closest approach on the evenings of October 20 and 21.)



Mars, the (orange) Red Planet

Skywatchers commemorated the star by calling it Antares, which means "anti-Ares," or, using the Roman name, "rival of Mars."

Mars begins the month well to the right of Antares, about the same height in the sky, but is well above the star by October's end.

FEATURED MYTH

Silence of the Damned

Astronomers know things.

They know that a giant asteroid will slam into Earth, killing everything on the planet. They know that Earth will pass through the tail of a comet that carries an alien virus, killing everything on the planet. They know that a small companion star to the Sun someday will plunge through the inner solar system, killing everything on the planet. They don't want to alarm you, however, so they share their discoveries only with other astronomers and with a few government agencies. Not even Fox Mulder could get the truth out of them.

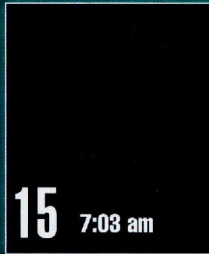
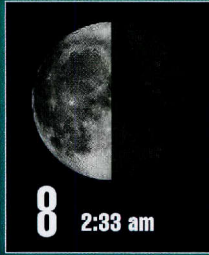
Those are just a few of the paranoid rumors floating around the Internet these days, as people who are certain that something from outer space is about to kill us try to warn their fellow Earthlings. They dismiss explanations and denials as propaganda designed to distract them from their mission. And just because they were wrong the last 20 or 30 times doesn't mean they're not right this time!

Such fantasies ignore the realities of how astronomers work, and the equal reality that astronomers (all 10,000 of them, according to the International Astronomical Union) are just as human as anyone else, so it's just as difficult for a group of them to keep a big secret as it is for the rest of us.

Astronomers do occasionally discover asteroids that will pass close to Earth, for example, and early calculations of the orbits of these objects occasionally show a small chance of a collision. Such discoveries have been shared with other astronomers through public forums, leading to big headlines for a few days — not to secret meetings guarded by big guys with uzis.

Overall, the idea that astronomers are hiding crucial discoveries defies common sense. So many people would know of such discoveries that the news would leak out quickly — these are, after all, people, not machines. Many of those discoveries would bring instant fame, and just about any of them would bring big research grants and higher prestige — something that astronomers and their universities compete for as vigorously as their football teams compete for blue-chip recruits.

So while it's true that astronomers know things, they don't make a habit of keeping them secret.



Moon phase times are for the Central Time Zone.

The full Moon of October is known as the Hunter's Moon or Dying Grass Moon.

APOGEE
October 4

PERIGEE
October 16

ANNIVERSARIES

50 Years Ago

A missile from Mars almost smacks a Nigerian farmer on October 3, 1962. The farmer was trying to chase cattle from his field when he felt a concussion, then saw a puff of smoke and an impact about 10 feet away. He eventually dug out a black meteorite that weighed about 40 pounds. Years later, measurements of tiny bubbles of gas trapped inside the meteorite, named Zagami for a landmark near its impact site, showed scientists that the meteorite was from Mars. It was blasted off the Martian surface when a large asteroid hit the planet about three million years ago.



A chunk of the Zagami meteorite

EVENTS

6-13 Twin Lakes Star Party
Dawson Springs, Kentucky

www.wkaa.net

8-14 Eldorado Star Party
Eldorado, Texas

texasstarparty.org/eldorado.html

10-13 Enchanted Skies Star Party
Socorro, New Mexico

enchantedskies.org

12-22 Mid-Atlantic Star Party
Robbins, North Carolina

www.masp.us

21 Astronomy Day

A nationwide celebration of astronomy in which museums, astronomy clubs, libraries, universities, and many other groups host star parties, lectures, and other events for general audiences. Many events are held at shopping malls or other convenient locations.

www.astroleague.org/al/astroday/astroday.html



OVERVIEW

Taurus, the bull, charges across the sky on November nights, standing high overhead around midnight. Look for his V-shaped face, highlighted by the orange star Aldebaran, and his twinkling shoulder, which is the tiny dipper-shaped Pleiades star cluster. Orion charges into the evening sky as well, rising in early evening by month's end. A faint lunar eclipse rounds out the month.

HIGHLIGHTS

- 1** Jupiter blazes above the Moon as they rise in early evening.
- 11** The Moon, the star Spica, and the planet Saturn form a tight triangle at first light today. Brilliant Venus is to the left of the Moon, with fainter Spica to the lower left.
- 12** The planet Saturn stands to the left of the thin crescent Moon, quite low in the east, at first light.
- 13** A total solar eclipse is visible across the northern tip of Australia and a long path across the southern Pacific Ocean during the afternoon hours on American clocks.
- 15** Mars is to the upper left of the Moon, low in the southwest at nightfall.
- 17** The Leonid meteor shower is at its best tonight, with no moonlight to spoil the show.
- 17-19** Brilliant "morning-star" Venus scoots past Spica, the brightest star of Virgo, in the pre-dawn sky. Spica is to the lower right of Venus on the morning of the 17th, level with it on the 18th, and to the upper right on the 19th. At their closest they are separated by about the width of two fingers at arm's length.
- 26-27** Venus and Saturn team up in the southeast at first light. Golden Saturn is to the left of radiant Venus on the 26th, and to its upper left on the 27th.

FEATURED EVENT

- 28** A faint eclipse of the Moon will take place.
- 28** Jupiter is to the lower right of the Moon as they climb skyward this evening. Jupiter is near its maximum brilliance.

NOVEMBER

Su	M	T	W	Th	F	Sa
				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	

NOVEMBER

The Moon passes through the penumbra (outer shadow) and into the umbra in this artist's concept.



NASA

FEATURED EVENT

Shadow Play

Eclipses are all about geometry. A lunar eclipse, for example, takes place when the Moon passes through Earth's long shadow. The Moon's orbit around Earth is tilted about five degrees with respect to the line between Sun and Earth, though, so most months the Moon passes a little above or below the shadow. But two or three times a year, the geometry is just right: the Moon's orbit intersects the line from Sun to Earth at full Moon, creating an eclipse.

Even then, geometry determines the quality of the eclipse. This month, for example, the Moon passes only through the hazy outer portion of Earth's shadow, known as the penumbra, so the eclipse is barely noticeable. The lunar disk will look slightly darker than normal, but not by much — most of us won't be able to tell the difference.

Earth's shadow consists of two zones: the dark inner portion, known as the umbra, and the hazy penumbra. The umbra is the region in which Earth completely covers the Sun, so if you were standing on the Moon when it passed through the umbra, you would see a total solar eclipse. At the Moon's distance, the umbra is about twice as wide as the Moon itself.

In the penumbra, Earth covers only part of the solar disk, so an observer on the Moon would see a partial solar eclipse.

If you have clear skies, you can see Earth's shadow shortly before sunrise or after sunset, when the Sun is just below the horizon. The shadow forms a dark blue-black belt on the horizon opposite the rising or setting Sun, with a band of pink above it, which is sunlight scattering through Earth's atmosphere. And a little later, the shadow is in even better view — immersing your part of Earth in the shadow of night.

Name means 'ninth month,' from the time when the year began in March

FEATURED MYTH

People are loonier than usual during the full Moon

It's common knowledge that the number of suicides, homicides, emergency room visits, police calls, and many other unpleasant behaviors spike at the time of the full Moon — a correlation known as the Transylvania Effect.

The funny thing about common knowledge, though, is that often it's no more reliable than old wive's tales or celebrity tweets. Scientific studies repeatedly have shown that, Hollywood werewolves notwithstanding, people don't act any stranger during the full Moon than at any other time during its 29.5-day cycle of phases.

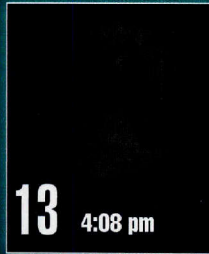
Over the last three decades, in scores of studies, psychiatrists, ER doctors, astronomers, and many other scientists have compared behavior to the phases of the Moon. The list includes suicides and attempted suicides, assaults, psychiatric and emergency-room admissions, and other types of violence, as well as such non-violent events as births. All but a few of the studies have shown that there is no correlation between behavior and lunar phases, and most of the studies that showed a correlation either were found to have errors or their results could not be replicated by other researchers.

Many police officers, emergency room workers, and others who deal with violent or stressful events are convinced that the Transylvania Effect is real, and often back it up with vivid anecdotes. Scientists who study the effect say that may largely be a selection effect: If you believe in something, you are more likely

to note events that fit it and ignore those that don't. A busy night in the ER that corresponds with a full Moon is more likely to linger in the mind than a busy night at new Moon. And events that support the belief are more likely to find their way into news reports and blogs, reinforcing the belief in popular culture.

So even though the word "lunacy" comes from the ancient

Roman name for the Moon, people don't act any loonier during the full Moon than at any other time of the month.



Moon phase times are for the Central Time Zone.

Daylight Saving Time ends November 4.

The full Moon of November is known as the Frost Moon or Snow Moon.

PERIGEE
November 14

APOGEE
November 28

ANNIVERSARIES

30 Years Ago

A meteorite startles a family in Wethersfield, Connecticut, when it punches through the roof of their house on the evening of November 8, 1982. A firefighter who responds to the call finds the six-pound chunk of space rock under the dining room table. Many witnesses had seen a fireball streaking through the sky shortly before the impact.

EVENTS

7-11 Deep South Regional Star Gaze
Norwood, Louisiana www.stargazing.net/dsrsg

12-18 CSPG Fall Star Party
Chiefland, Florida chieflandstarpartygroup.com/events.html

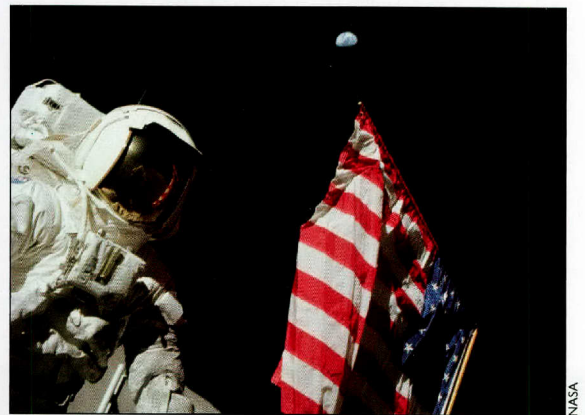
MICRO-MYTHS

The North Star is the brightest star in the sky

The North Star, Polaris, is a wonderful beacon for guiding sailors and casual skywatchers alike. Its value, however, comes from its position, not its brightness. It marks the north celestial pole, so as seen from the northern hemisphere, it remains in the same position all night, every night. Yet it is only the 48th-brightest star system in the night sky.

A 'falling star' is literally a star falling from the sky

A "falling star" or "shooting star" is actually a meteor, which is a bit of cosmic debris that is burning up as it zips through the atmosphere. Most of these bits are no bigger than a BB or perhaps a marble.



NASA faked the Moon landings

Yes, and thousands have kept the secret for decades, including the Russians, who were providing a quid pro quo for the American government not revealing details about all the dead cosmonauts stuck in orbit. Or perhaps, following the principle that says the most likely explanation is the simplest one, the Moon landings were real — and one of the greatest accomplishments in history.



OVERVIEW

A lineup of bright stars and planets greets early risers in the eastern sky this month. The brightest of them is Venus, the “morning star,” which is low in the sky at first light. Elusive little Mercury, the planet closest to the Sun, rises beneath Venus, never quite climbing as high as its brighter sibling. Giant Saturn is above Venus, with Spica, the brightest star of Virgo, highest of all. The exact configuration changes from night to night. Sirius, the brightest star in the night sky, rises earlier each evening and dominates the southern sky for much of the night. It rises below mighty Orion; follow the hunter’s three-star belt downward to spot the Dog Star.

HIGHLIGHTS

FEATURED EVENT

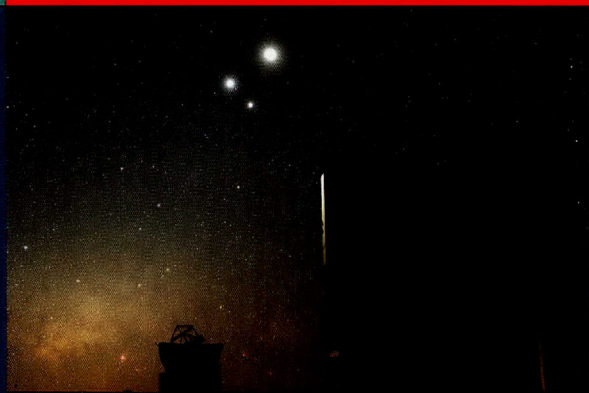
- 2** Jupiter is at its best for the year, shining all night. Aldebaran is close to its lower right as they rise, with the Pleiades star cluster well above Jupiter.
- 5** Regulus, the brightest star of Leo, is close to the left of the Moon as they rise in late evening.
- 9-11** The Moon sweeps past three bright companions before dawn. On the 9th, the star Spica is quite close to the upper left of the Moon. On the 10th, Saturn is farther to the left of the Moon, with brilliant Venus well below them. And Venus snuggles close to the upper left of the Moon on the 11th. Fainter Mercury, the planet closest to the Sun, is a little below them.
- 13** The Geminid meteor shower is at its best tonight.
- 14** Mars is to the left of the Moon, low in the southwest, about 45 minutes after sunset.
- 21** Winter arrives in the northern hemisphere at 5:12 a.m. CST, which is the moment of the winter solstice.
- 24/25** Jupiter is the brilliant “star” near the Moon. Jupiter is to the lower left of the Moon at nightfall on the 24th, and quite close to the left or upper left of the Moon on the 25th. At their closest, they are separated by about the width of a finger at arm’s length.

DECEMBER

Su	M	T	W	Th	F	Sa
						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					

DECEMBER

Name means ‘tenth month,’ from the time when the year began in March



ESO/YBELETSKY

A tight grouping of the Moon (brightest object), Venus (lower left), and Jupiter (bottom) over the European Southern Observatory in Chile.

FEATURED EVENT

Drifting Along with a Giant

On the scale of our everyday lives, Earth is a big place — so big that an airliner, flying nonstop, would take about two days to circle its equator. But our planet is tiny compared to Jupiter, the largest planet of the solar system. Jupiter is 11 times bigger around than Earth is, so an airliner would need about three weeks to circle Jupiter’s equator.

The sights out the window would be spectacular.

Jupiter doesn’t have a solid surface, so you wouldn’t see mountains, deserts, or oceans. But the Jovian atmosphere is filled with giant storms and with belts of clouds that race around the planet at hundreds of miles an hour. To avoid turbulence, you would have to detour around the biggest storms, although that could add days to the trip, because Jupiter’s storms can be as big as Earth. The storms produce lightning bolts that are hundreds of times as powerful as those on Earth, so at night such blasts might be visible for hundreds or even thousands of miles.

Various chemicals in the atmosphere add color to the clouds, so you would see shades of yellow, brown, and red mixed with white clouds made of water vapor.

And if you are afraid of heights, you wouldn’t want to look down: The cloud layers atop the Jovian atmosphere are scores of miles thick, so it would be a long way down.

Since such journeys likely are centuries away, for now we must be content with viewing Jupiter from afar. This month, the giant planet puts in its best showing of the year. It is at opposition on December 2, so it lines up opposite the Sun in Earth’s sky. It rises around sunset and is visible all night, glowing brighter than anything else in the night sky except the Moon and Venus.

FEATURED MYTH

The world will end on December 21, as prophesied by the ancient Maya

No other astronomy-related myth has generated more buzz than this one. It tells us that the Mayan calendar ends on December 21, on a date known as 13.0.0.0.0. Further, the myth says that the Maya prophesied that the end of this calendar cycle will bring the destruction of Earth, perhaps from a celestial source.

What's more, the myth tells us, on December 21 the Sun will stage a rare alignment with the center of the galaxy, somehow channeling a cosmic energy source toward our planet. That could result in Earth's destruction through a collision with an asteroid, a comet, a giant planet, or even a faint binary companion to the Sun.

This elaborate scenario is great for selling books and Hollywood movies and generating hits on websites, but it has no scientific basis whatsoever.

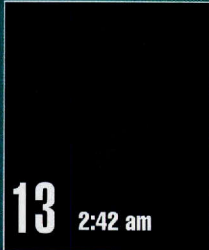
Archaeological evidence does suggest that the longest version of the calendar used by the classic Maya, known as the Long Count, will reset on December 21. Yet there is no evidence of predictions of global cataclysm. Instead, the Maya viewed this date as simply the beginning of a new cycle, much as our calendar "recycled" when it turned from December 31, 2000, to January 1, 2001, ushering in a new millennium.

The astronomical evidence cited by the mythmasters is just as trumped up. The Sun will indeed be passing roughly in front of the center of the galaxy on December 21, but that is not a rare event; the Sun passes that same point in space every year. The point drifts from year to year, but only by a tiny fraction, which means the Sun appears at almost precisely the same point on the same date for many years in a row. In other words, this alignment happens all the time without harm.

And there is absolutely no evidence of a companion star, a brown dwarf, or a giant planet barreling toward Earth. Such an object would be easily visible not only through telescopes, but to the unaided eye.

An asteroid known as Toutatis will pass about 4.3 million miles from Earth on December 12, and the asteroid Apophis will pass about 8.9 million miles away on January 9, 2013, but neither presents any danger to Earth on these passes.

So, like all the days before it, 13.0.0.0.0 on the Mayan calendar will come and go without cosmic interruption.



Moon phase times are for the Central Time Zone.

The full Moon of December is known as the Long Night Moon or Moon Before Yule.

PERIGEE

December 12

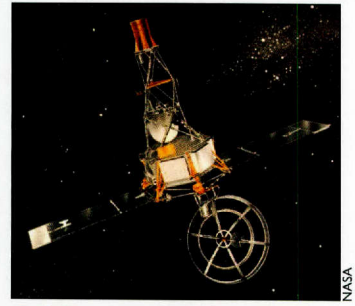
APOGEE

December 25

ANNIVERSARIES

50 Years Ago

Mariner 2 becomes the first spacecraft to study another planet from close range when it sweeps within 21,600 miles (34,800 km) of Venus on December 14, 1962. Its instruments discovered that the planet's surface temperature is hot enough to melt lead, with little change in temperature across the entire globe.

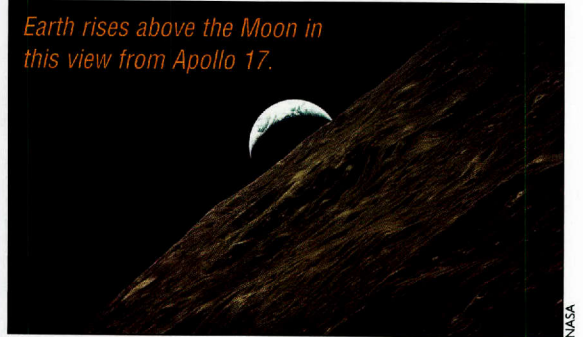


Artist's concept of Mariner 2 in flight

40 Years Ago

The final Apollo lunar mission lands on the Moon on December 11, 1972. Astronauts Gene Cernan and Harrison Schmitt, the first geologist to walk on the Moon, spend three days in a region known as Taurus-Littrow, collecting more than 240 pounds (110 kg) of rocks and soil. Their haul includes a sample of orange soil that, in 2011, was reported to show that the Moon was born with much more water than earlier studies had indicated. Crewmate Ron Evans conducts a spacewalk en route back to Earth. The Apollo program ends with their splashdown on December 19.

Earth rises above the Moon in this view from Apollo 17.



A bevy of bright planets takes over the evening sky as the new year begins. Venus and Jupiter, the second- and third-brightest objects in the night sky after the Moon, dominate the western sky in early evening, with Jupiter hanging around until after midnight. Orange Mars is less impressive as the year begins, but is moving toward its best showing of the year. And brilliant Orion, one of the most impressive of all constellations, climbs high across the sky during the night, providing a beautiful accent to the long, cold winter nights.

JANUARY 1 - 15

Venus reigns in the southwest during twilight, slowly continuing its months-long climb to greater evening heights. It outshines all other starlike objects at dusk. Once night falls, Venus drops lower in the sky before setting around 7 or 8 p.m.

In second place for brightness is Jupiter, shining much higher in the south during and after dusk. Unlike Venus, Jupiter remains in view all evening as it slides down the southwestern and western sky. It doesn't set until after the cold January midnight.

In third place for brightness, we finally encounter a star: Sirius, the Dog Star, rising in the east-southeast below Orion soon after darkness is complete. Sirius is well up in the southeast by mid-evening, twinkling fiercely.

Tied for fourth-brightest are Rigel in Orion's foot, well to the upper right of Sirius, and Capella, now approaching the zenith (the point directly overhead) from the east.

Orion is the brightest winter constellation. It looks like a tilted, bent rectangle of four bright stars, with Rigel form-

ing its right-hand corner and with an eye-catching row of three stars in its center. The row is Orion's Belt, which is nearly vertical early on January evenings.

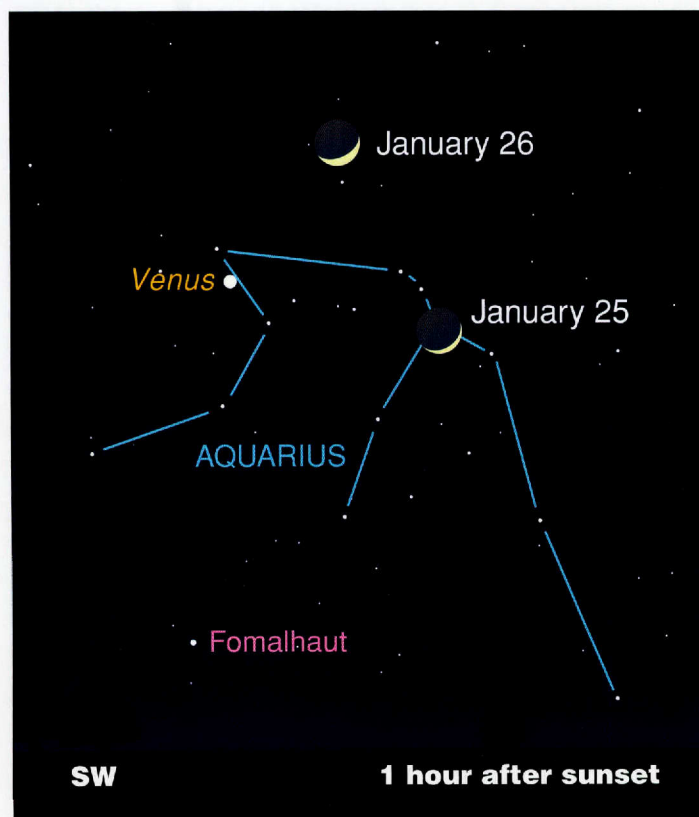
Orion's shoulders are marked by orange-red Betelgeuse, a fist-width at arm's length to the Belt's left or upper left, and by slightly fainter Bellatrix to the upper right of Betelgeuse.

Orion's Belt points the way to other winter landmarks farther afield. Follow it upward, for example, and you'll come (more or less) to orange Aldebaran, about two fist-widths from the Belt. Farther beyond Aldebaran is the distinctive little Pleiades star cluster.

In the other direction, Orion's Belt points downward by two fists toward brilliant Sirius.

Later in the night, we can round out the roster of bright planets: Mars rises in the east in late evening, below Leo. Saturn rises three hours later, in Virgo.

And Mercury makes its appearance as dawn brightens. Look for Mercury low in the southeast during the first few days of January. (Don't



confuse it with orange Antares to its upper right.) If you can deal with the cold, go out and have a look. Dawn comes later in early January than at any other time of year.

JANUARY 16 - 31

You can hardly miss Venus now! It is higher in the twilight each evening, and is growing brighter each week. The waxing crescent Moon shines to Venus' right on January 25 and above it on the 26th.

Notice that Jupiter, which is high in the south to southwest, is creeping across the sky toward Venus week by week. These two brilliant planets will continue drawing together until they pass close by each other (by just two finger-widths at arm's length) in mid-March.

As winter advances, look

for Orion climbing higher in the southeast and rotating to stand more upright. Let's continue using him as a starting point.

The bright star forming Orion's top left corner is Betelgeuse, almost exactly the same orange tint as Aldebaran. Pick up brilliant Sirius

Meteor Watch

The Shower

Quadrantids
Named for the extinct constellation Quadrans Muralis, which honored an astronomical instrument.

Peak
January 3

Notes
The shower is one of the year's most active, with perhaps 80 to 100 meteors per hour at its peak. The peak lasts only an hour or two, however, so the viewing window is brief. The Moon sets by around 3 a.m., leaving a few hours of unobstructed viewing before dawn.

again, below Orion and now perhaps a bit to the left. Betelgeuse and Sirius form a big equilateral triangle — the Winter Triangle — with a third bright star, Procyon, to their left.

Capella is the brightest star high in the east. Even higher, near the zenith around 7 or 8 p.m. (depending on your location), is the constellation Perseus. Its brightest star is Mirfak, or Alpha Persei. A pretty swarm of faint stars trails off to its southeast. It is known as the Alpha Persei Association — a collection of young stars born together from the same original cloud of interstellar gas and dust. If your sky isn't dark enough for you to see them with the unaided eye, binoculars will reveal them easily.

FEBRUARY 1 - 15

Venus remains high and bright, and now there's no question about it: Jupiter is closing in on it from above. Can you detect their separation narrowing each evening?

Orion now stands upright at its highest in the south after dinnertime, and Orion's Belt is now diagonal, pointing to the lower left toward bright Sirius, and upper right toward Aldebaran.

Aldebaran marks the eye of the ancient constellation Taurus, the bull, which the hunter Orion is supposed to be driving backward, ever westward, with his club and shield. Sirius is the Dog Star, the brightest light of Orion's big dog, Canis Major, behind his feet.

To the left of Sirius by about two fist-widths at arm's length, and perhaps a bit higher, is Procyon, the Little Dog Star, in Canis Minor, Orion's other dog.

The very bright star prac-

tically overhead when you face east in early evening is Capella, which shines pale yellow-white, like the Sun. Capella is the brightest star of Auriga, the charioteer, who looks more like a large, flattened pentagon. Capella (when you face east early these evenings) marks the pentagon's top left corner.

And high in the northwestern sky is Cassiopeia, a flattened W, starting its long descent for the season.

Later in the evening, Mars

for Mercury is February 22, when a hairline-thin crescent Moon hangs to its right. Start looking 20 or 30 minutes after sunset; binoculars will help.

On February 25, the crescent Moon, now thicker, shines close to Venus, forming an eye-catching pairing.

Mars shines brightly low in the east after nightfall as it nears its March 3 opposition — when it will be opposite the Sun in our sky and just about at its closest

low the Pointer stars in the opposite direction, to the right, by about four fist-widths, to reach Leo, the springtime lion.

Shining high in the southeast after dinnertime is Procyon, to the left of Orion and upper left of brighter Sirius. Look about halfway between Procyon and Regulus for a dim but distinctive star pattern: the head of Hydra, the water serpent. Most of Hydra's long, dim body is only starting to snake up from

A Sirius Primer

Widely known as the "Dog Star" as the leading light of Canis Major, the big dog, Sirius is the brightest star in the night sky. Its name is from the Greek for "searing" or "scorching." It shines high in the southeast after dark on January and February evenings from its distance of 8.6 light-years. Intrinsically 26 times brighter than the Sun, Sirius is about twice the Sun's size.

Though its companion is invisible to the unaided eye, Sirius is actually a binary star (right). January 31 marks the 150th anniversary of the discovery of Sirius B by Alvan Graham Clark. The two stars in this binary pair orbit extremely close to each other — both would fit inside our solar system.

Smaller and just 1/10,000th as bright as its partner, Sirius B is a white dwarf, the burnt-out remnant of a Sun-like star. This cinder has about the same mass as the Sun packed into a volume the size of Earth. Sirius B is one of the heaviest known white dwarfs. A piece of it the size of a sugar cube would weigh more than a ton.

RJ

glows in the east by 9 or 10 p.m. Look to the planet's left for blue-white Denebola, the tail of Leo, the lion. High to Mars' upper right is Regulus, the lion's heart.

FEBRUARY 16 - 28

Bright Venus and Jupiter in the western twilight shine closer together with each passing day, on their way to their mid-March conjunction. And Venus is close to its most brilliant for its current evening appearance.

A third planet also lurks in the west. As February nears its end, look far to the lower right of Venus during bright twilight for little Mercury. A good date to start looking

and brightest. Still, don't get your hopes up for Mars in a telescope. Even at opposition it will appear only 13.9 arc-seconds wide; this is the planet's most distant opposition in 17 years.

As Orion and company continue shifting westward across the southern sky, let's look at some new arrivals in the east.

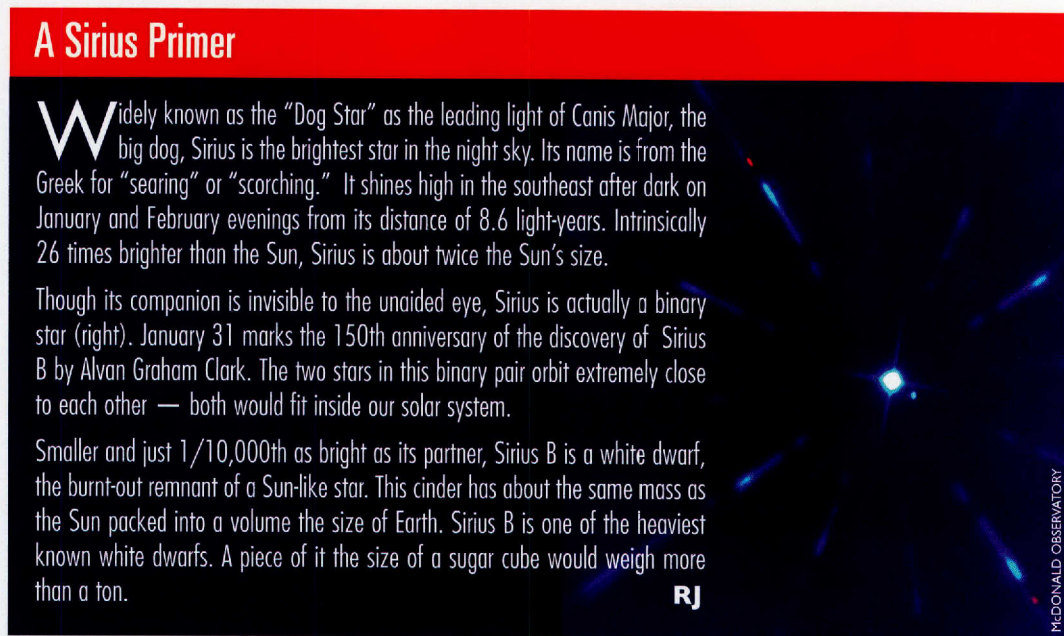
In the northeast after dinnertime, look for the Big Dipper standing upright on its handle. Like Orion, the Big Dipper is an important celestial guidepost. The top two stars of the Dipper's bowl point left to Polaris, the North Star (three fist-widths at arm's length away). Fol-

the east-southeast, but look down low and you may spot orange-red Aldebaran, Hydra's heart, making its way up.

The great bear, the lion, and the sea serpent — they are an odd trio of big beasts, but every spring they rise up in parallel, as if emerging from hibernation in the east.

And if you wait up until after 10 p.m. (depending on your location), you can spot Saturn rising in the east, with Spica to its upper right and brighter Arcturus four times farther to its left or upper left.

Alan MacRobert is a senior editor of Sky & Telescope magazine in Cambridge, Massachusetts.

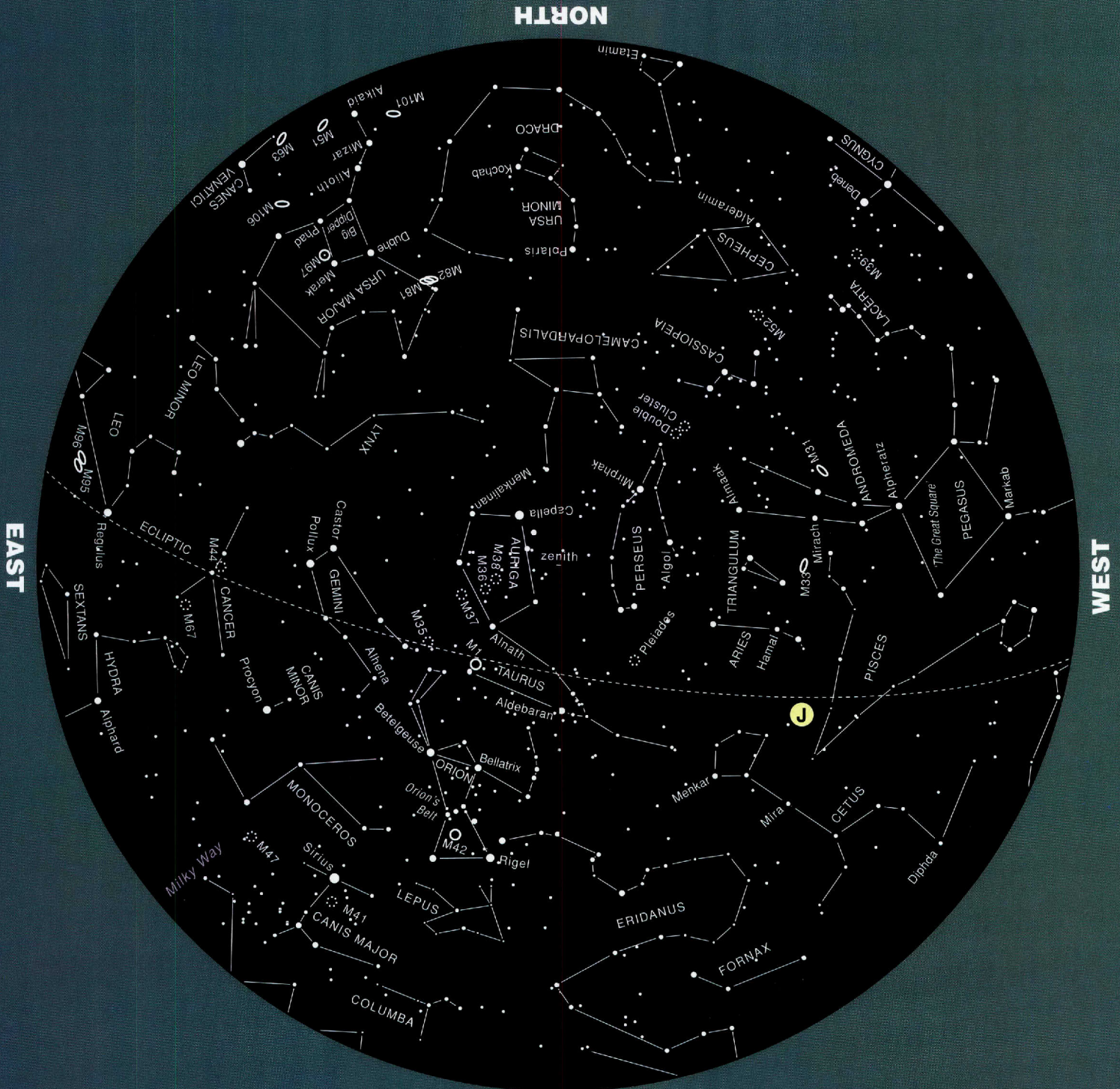


JANUARY

How to use these charts:

1. Determine the direction you are facing.
2. Turn the chart until that direction is at the bottom.

December 20 11 p.m.
 January 5 10 p.m.
 January 20 9 p.m.



MAGNITUDES

- 0 and brighter
- 1
- 2
- 3
- 4 and fainter

SOUTH

- J Jupiter
- ⊙ open cluster
- ⊙ globular cluster
- nebula
- planetary nebula
- galaxy

FEBRUARY

How to use these charts:

1. Determine the direction you are facing.
2. Turn the chart until that direction is at the bottom.

January 20

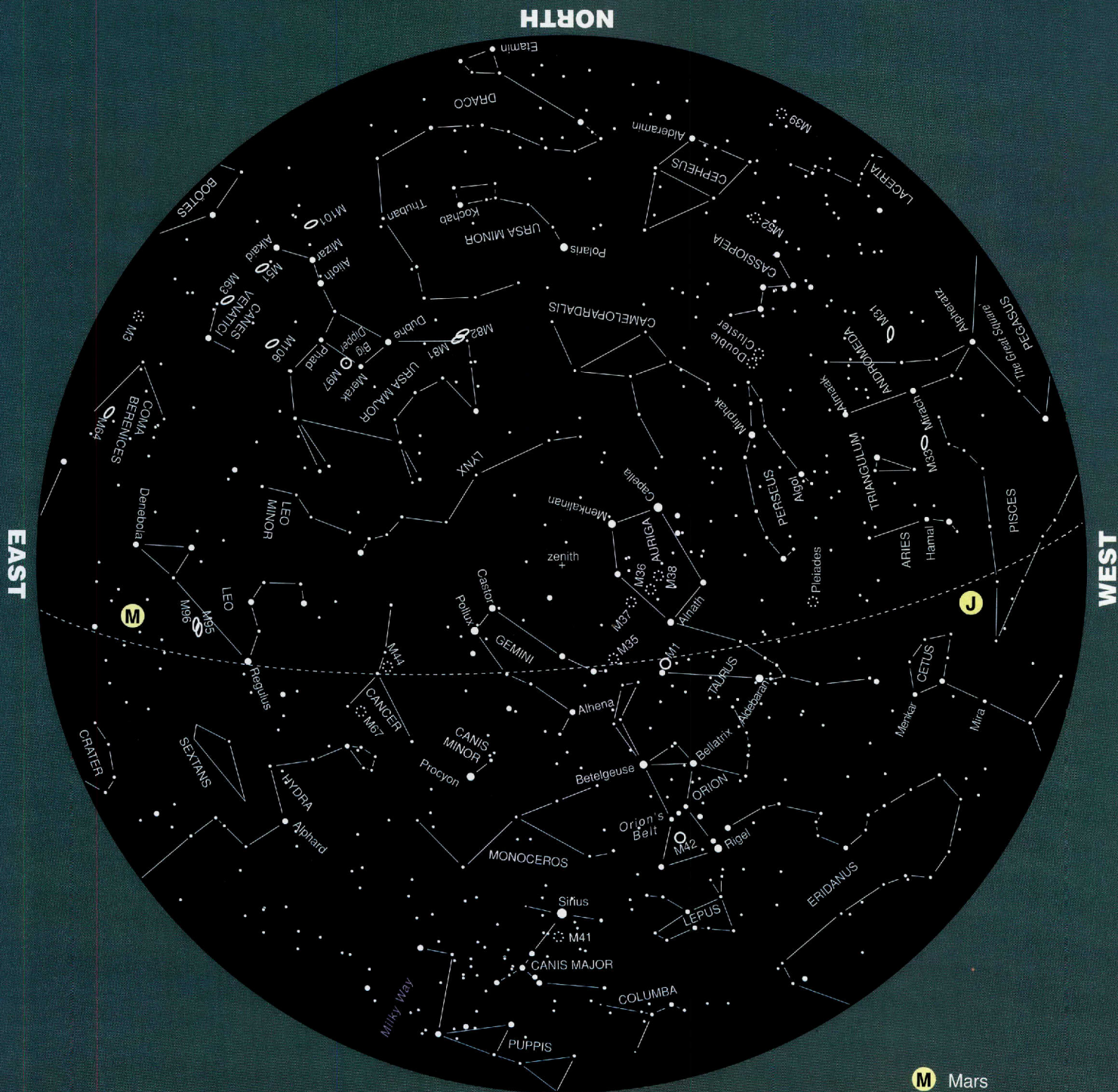
11 p.m.

February 5

10 p.m.

February 20

9 p.m.



MAGNITUDES

- 0 and brighter
- 1
- 2
- 3
- 4 and fainter

M Mars

J Jupiter

••• open cluster

••••• globular cluster

○ nebula

○ planetary nebula

○ galaxy

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