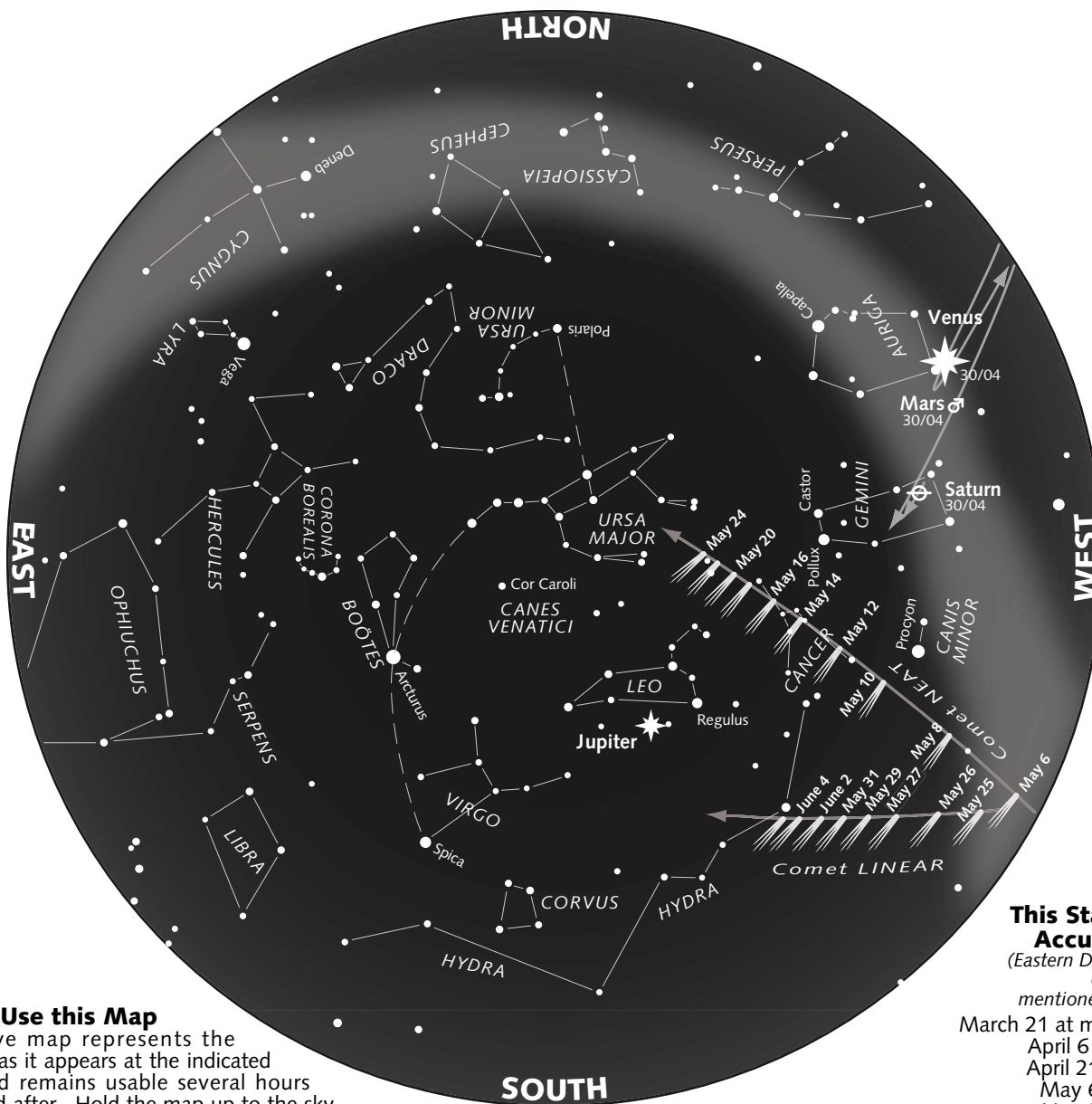


## The Starry Sky — Spring 2004



Map: Marc Jobin / Planétarium de Montréal

### How to Use this Map

The above map represents the night sky as it appears at the indicated times, and remains usable several hours before and after. Hold the map up to the sky in front of you and turn it so the direction you are facing appears at the bottom. Lines identify the constellations. The light band outlines the Milky way.

**This Star Map is Accurate on...**  
(Eastern Daylight Time, except where mentioned otherwise)

- March 21 at midnight EST
- April 6 at midnight
- April 21 at 11 p.m.
- May 6 at 10 p.m.
- May 21 at 9 p.m.

### Seasonal Milestones

The **spring equinox** occurs on March 20 at 01:49. The **summer solstice** will take place on June 20 at 20:57 EDT. Spring 2004 will last 92d 18h 08m.

On the night of April 3 to 4, we switch to **Daylight Time**: Clocks move ahead one hour.

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DE MONTRÉAL**

planetarium.montreal.qc.ca

Ville de Montréal

### Phases of the Moon

(Eastern Daylight Savings Time)  
except \* = Eastern Standard Time

Full moon	Last quarter
March 6 at 18:14*	March 13 at 16:01*
April 5 at 7:03	April 11 at 23:46
May 4 at 16:33	May 11 at 7:04
June 3 at 0:20	June 9 at 16:02
New moon	First quarter
March 20 at 17:41*	March 28 at 18:48*
April 19 at 9:21	April 27 at 13:32
May 19 at 0:52	May 27 at 3:57
June 17 at 16:27	June 25 at 15:08

# The Sky This Spring

*Winter's planetary parade continues this spring, featuring Venus, Mars, Jupiter and Saturn. And a brief appearance by Mercury provides a rare opportunity to see all five "naked-eye" planets at once. But among this star-studded retinue, Venus definitely outshines them all.*

## Venus steals the show

It should come as no surprise that **Venus** is the third brightest celestial object — surpassed only by the Sun and Moon. Throughout winter Venus was the dazzling "evening star" — the first star-like object to appear in the west at twilight — and it will continue to grace the sky until May.

This apparition of Venus is extremely favorable. Toward the end of March, the planet appears 46 degrees from the Sun — its greatest solar separation. On top of that, the line joining Venus and the Sun forms a very steep angle to the horizon. As a result, Venus is very high in the evening sky at the beginning of spring. In fact, during this period, the dazzling planet sets 4 1/2 hours after the Sun!

While the winter constellations drift progressively toward the western horizon, Venus moves eastward among the stars. This explains why the evening star seems to remain at about the same place in the sky night after night. Along the way, Venus passes the Pleiades — a magnificent star cluster in Taurus. **On April 2 and 3**, the two objects are less than a degree apart. If you follow this celestial encounter you can see how much Venus moves from one evening to the next.

In fact, Venus' motion also brings it seemingly closer to Mars: **By April 25**, the two planets are just 5 1/2 degrees apart. But then, Venus loses ground and slips from its celestial perch — slowly at first and then progressively faster. In May, the evening star quickly loses altitude and disappears in the Sun's glare by the end of the month. A few days later, on June 8, Venus is in inferior conjunction. At this point the planet's orbit carries it exactly between the Sun and Earth, which will result in a rare (and widely anticipated) event

known as a "solar transit" (see page 4).

Venus certainly captures the eye, but through a small telescope it offers a truly fascinating show. In fact, the planet's changing aspects are easy to observe. Because Venus' orbit brings it closer to Earth this spring, its apparent diameter will increase dramatically. At the same time, the planet's illuminated portion will change from a quarter phase to a thin crescent.

In just a month-and-a-half, a spectacular transformation unfolds! At the end of March, Venus' disk is exactly half lit and measures 24 arcseconds across. However, by mid-May its apparent size doubles to 47 arcseconds, and it takes on a classical crescent shape with two distinct "horns."

During the waning days of May, Venus grows even larger: As its crescent gets progressively thinner, its disk swells to nearly one minute of arc (1/60<sup>th</sup> of a degree)! Unfortunately, by this time Venus is very close to the horizon, and observing conditions deteriorate rapidly.

**On March 24**, at nightfall, the crescent Moon is just two degrees to the left of Venus — a spectacular sight not to be missed! The Moon also appears near Venus on April 22 and 23, and again on May 20 and 21, but on these occasions the two are not nearly as close.

## Jupiter at its best

**Jupiter** spends the coming months beneath the constellation Leo. The giant planet was in opposition on March 3. This spring it has already risen

by nightfall, so the optimum time for observing it gets earlier and earlier. At the end of March, Jupiter culminates in the south at about 22:30. By the beginning of May, the planet has already culminated at twilight's end, and is then best observed right after dark.

Jupiter is another choice target for telescopes. Even small instruments reveal the four moons discovered by Galileo (the total number now surpasses sixty!) and some of the planet's atmospheric cloud bands.

The Moon's monthly orbit regularly carries it near the giant planet in the sky. On the night of April 2 to 3, the gibbous Moon is situated 3 1/2 degrees to the left of Jupiter; on April 29, the Moon is 3 degrees above the planet; and finally, the first quarter Moon is near Jupiter once again on May 26 and 27.

## Saturn — one last look

This spring, **Saturn** is situated at the center of the constellation Gemini, just to the upper left of Orion. Right now Saturn's rings are wide open, which makes it — without doubt — one of the most beautiful sights in the sky. A small telescope reveals the rings easily, but a larger instrument truly shows the planet in all its glory.

Don't wait too long! In May, conditions for observing the ringed planet deteriorate rapidly. By then it is too low on the horizon to view clearly, and by early June it disappears completely in the Sun's glare.

The crescent Moon is near Saturn on the evenings of March 28, April 24 and 25, and again on May 22. On this final occasion, Mars is also in the picture: The two planets are just 1 1/2 degrees apart on May 25.

## Mars — engulfed by the Sun

**Mars** remains visible this spring →

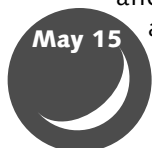
March 31



May 1<sup>st</sup>



May 15



May 31



### And Mercury Makes Five!

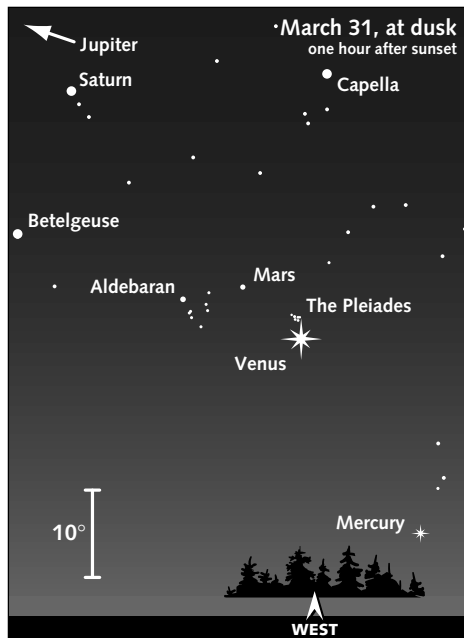
Mercury is the hardest planet to observe with the naked eye: It's close to the Sun and never far above the horizon. As a result, the tiny planet is only visible at dusk or dawn, and only for brief periods of time.

However, as spring gets underway, Mercury favors us with an excellent apparition. To see it, just look toward the western horizon, **from March 23 to April 6**, about half-an-hour after sunset. The tiny planet will be brighter toward the beginning of this period. A quick word of advice: An ordinary pair of binoculars can help you find Mercury in the glow of twilight.

#### Five planets at once

This apparition of Mercury provides an excellent opportunity to observe all five "naked-eye" planets at the same time. Mercury joins Venus, Mars, Saturn and Jupiter, which were all visible throughout the winter.

Until about April 6, the five planets known to ancient observers can be seen in the evening sky at once. While not considered extremely rare, such



events are certainly not common.

Face west about 45 minutes after sunset. Brilliant Venus is, by far, the easiest to identify. But if the sky is clear and unobstructed, you'll also notice Mercury somewhat closer to the horizon and slightly to the right. Mars is above Venus and to the left, while Saturn is higher still, about two thirds of the way between the horizon and the zenith. Note that the four planets fall, more-or-less, on the same imaginary line — a fact that will no doubt help you with your search.

To locate the fifth planet, you'll have to stand with your back to the first four. Jupiter is the very bright "star" shining in the east. Along with the Moon, also visible during this period, and the Sun (whose presence is indicated by the glow of twilight) you will see before you all the wandering celestial bodies known since the dawn of humanity...

### Two Comets in the Springtime Sky

It's rare to learn of the appearance of a potentially bright comet more than a few months in advance. Yet this spring, two comets will be visible at the same time: Comet NEAT (C/2001 Q4) discovered in August 2001, and comet LINEAR (C/2002 T7) discovered in October 2002. Though they will be ideally placed for observation from the

➔ in the west at twilight. Its frenzied eastward rush among the stars carries it from Taurus into Gemini on May 7, and it skims by Saturn on May 25.

On the evening of March 25, the crescent Moon is just 1/4 degree to the right of the Red Planet; and the two are just a few degrees to the left of the Pleiades star cluster. On April 23, Mars is located 2 degrees below the lunar crescent; and on May 22, the Moon is situated below both Saturn and the Red Planet.

But the Sun finally catches up to Mars, and it sinks into the glow of twilight by mid-June.

*Good observing!*

southern hemisphere, we'll have to wait until the final weeks of their visit to see them from our northern latitudes.

Comet NEAT will appear first, above the southwest horizon during the evenings of early May. After May 5, it should be high enough to see with ease. On that date NEAT will be 9 degrees to the left of the bright star Sirius, which serves as an excellent reference point. Both objects will be 8 degrees high about 30 minutes after sunset. The comet's tail will extend toward the left and be parallel to the horizon.

Over the following nights, NEAT will gain altitude, which should afford an excellent view against dark skies after twilight. On May 10, the comet is situated 6 degrees to the left of the star Procyon. On the night of May 14, comet NEAT passes two degrees below the magnificent Beehive star cluster (M44) in the constellation Cancer. This is a sight not to be missed! Finally, NEAT will continue its northbound route into Ursa Major,

where it will disappear in June.

Will comet NEAT become bright enough to see with the naked eye? Some predictions are optimistic, but forecasting a comet's brightness is difficult due to many uncertainties: Disappointments are common. One thing is sure, the first half of May will see NEAT at its brightest after which, it will fade from view as it slowly heads away from the Earth and Sun.

Comet LINEAR will be much harder to spot. It will become visible during the final days of May, and will remain just a few degrees above the west-southwest horizon. Unfortunately, LINEAR will only be observable during twilight, about an hour after sunset. Since its brightness will already be declining, the best chance to view it is at the end of May. Technically though, the comet will remain in telescopic sight until July.

Just as LINEAR becomes visible, comet NEAT will be situated between the legs of Ursa Major, and will still be reasonably bright. Two comets for the price of one? Why not!

## An historic event

# On June 8, Venus Passes In Front of the Sun

A very rare event is due to happen this spring!  
For the first time in 122 years, Venus will pass directly between the Earth and Sun.  
For several hours, the planet will appear silhouetted against our daytime star.

Every 584 days, Venus passes between the Earth and Sun: This is known as *inferior conjunction*. Normally though, Venus' orbit carries it either above or below the Sun's disk. But on rare occasions, when the inferior conjunction occurs in early June or early December, Venus' alignment carries it directly in front of the Sun. This is called a *transit*.

Transits of Venus usually occur in pairs, eight years apart: Each pair is separated from the next by either 105 ½ or 121 ½ years, in alternating sequence. The last transit of Venus was in 1882, so no living person has seen one!

During the 18<sup>th</sup> and 19<sup>th</sup> centuries, a number of expeditions were mounted to observe the transit of Venus from the four corners of the globe. At that time, such events were considered extremely valuable, scientifically speaking. The transit of Venus offered a unique opportunity to calculate the distance between the Earth and the Sun. With this measurement, it was then possible to determine the distance of all the planets in the solar system, and even the closest stars.

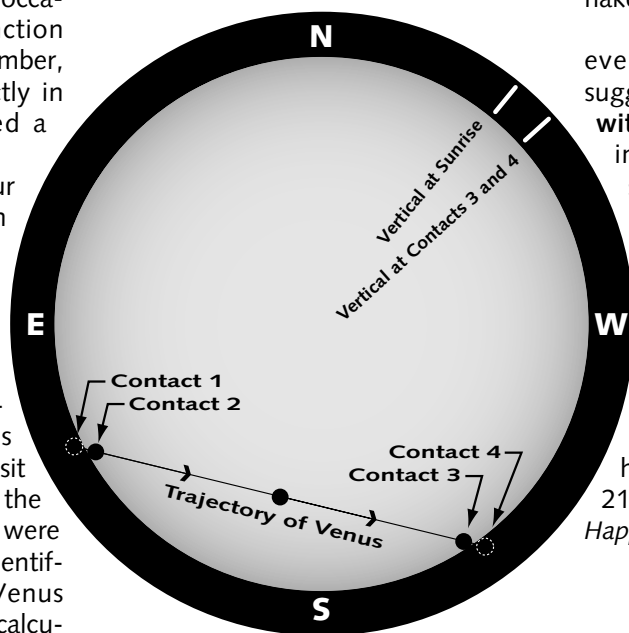
Today, the distance to the planets is measured with great precision thanks to radar. The transit of Venus is now of interest only because it is rare, and because of the history it evokes.

### Transit 2004

On June 8, 2004, Venus will cross the Sun's disk in roughly 6 hours and 12 minutes. This transit will be visible in its entirety throughout Europe, and most of Africa and Asia. In the eastern

Americas, the transit will already be underway at sunrise.

In Montreal, when the Sun rises at 5:06 EDT, Venus will be more than half



way through its passage across the solar disk. But the final portion of the transit will be the most interesting. From 7:05:18 to 7:25:18, the planet will cross the edge of the Sun — a total of 20 minutes. These times are referred to as contacts 3 and 4. During this time, the Sun will be 20 degrees above the horizon. Elsewhere in Quebec, the exact time of egress will vary by several seconds, depending on the observer's location.

### Observation

During its transit, Venus will appear like a perfectly round, black dot measuring

about 1/32<sup>nd</sup> of the Sun's diameter. Using special protective filters, those with good eyesight should be able to see the silhouette of Venus with the naked eye.

In order to fully appreciate the event, a telescope or binoculars are suggested, but **they must be equipped with a special solar filter**. The Sun's image can also be projected on a screen with a pair of binoculars or small telescope. In this case, a filter should not be used. However, the setup must be monitored at all times to ensure that no one accidentally looks through the optics.

If you miss this transit of Venus, the next one will occur on June 6, 2012. After that, you'll have to wait until December 11... 2117!

Happy observing!

Research, text and illustrations:

**Marc Jobin**

Translation: **Louie Bernstein**

### Important Warning

Great care must always be taken when observing the Sun: Intense solar radiation can cause instantaneous burns, and permanent damage to the retinas. When observing the Sun directly, either with the naked eye, or a telescope, **one must always use specially designed solar filters**.

For more information on the transit of Venus, and safe solar observing, log onto our website at

[www.planetarium.montreal.qc.ca](http://www.planetarium.montreal.qc.ca)