

A starry night sky with a silhouette of a person in the foreground. The person is standing with their arms raised, looking up at the stars. The sky is filled with numerous stars, and the horizon shows a dark silhouette of trees and a building.

ASTRONOMY 101: A Retiree's Guide to Backyard Astronomy

Dave Leake

William M. Staerckel Planetarium (retired)

OLLI Fall, 2021

For 8 Weeks . . .

- 1) The Sky and how it seems to move
- 2) Distance, brightness and how to find things in the sky
- 3) Observing and understanding the Moon
- 4) The planets and how to see them
- 5) Comets, asteroids and meteor showers
- 6) The Deep Sky (nebulae, star clusters and galaxies . . . Oh my!)
- 7) A buyer's (and user's) guide to telescopes and binoculars
- 8) Your questions about astronomy



Please submit questions

dleake@parkland.edu

Champaign-Urbana Astronomical Society, Inc



Next meeting: Oct. 14, 7pm
Staerkel Planetarium/Zoom

Middle Fork Starwatch: Oct 2,
6:30

Prairie Winds open house: Oct. 9
6:30pm

www.cuas.org

Me?

- Retired in 2019 after 30 years at Parkland College
- Director, Staerkel Planetarium from 2000-2019
- Founder, CU Astronomical Society (1986)
- Solar System Ambassador (?)
- International Dark Sky Park
- WCIA “Whys Guy”
- *Now. Radio DJ & News!*



Handouts/Projects:

- Online pdf you can download if you wish
- Suggestions on things to go out and see
- All optional!!!



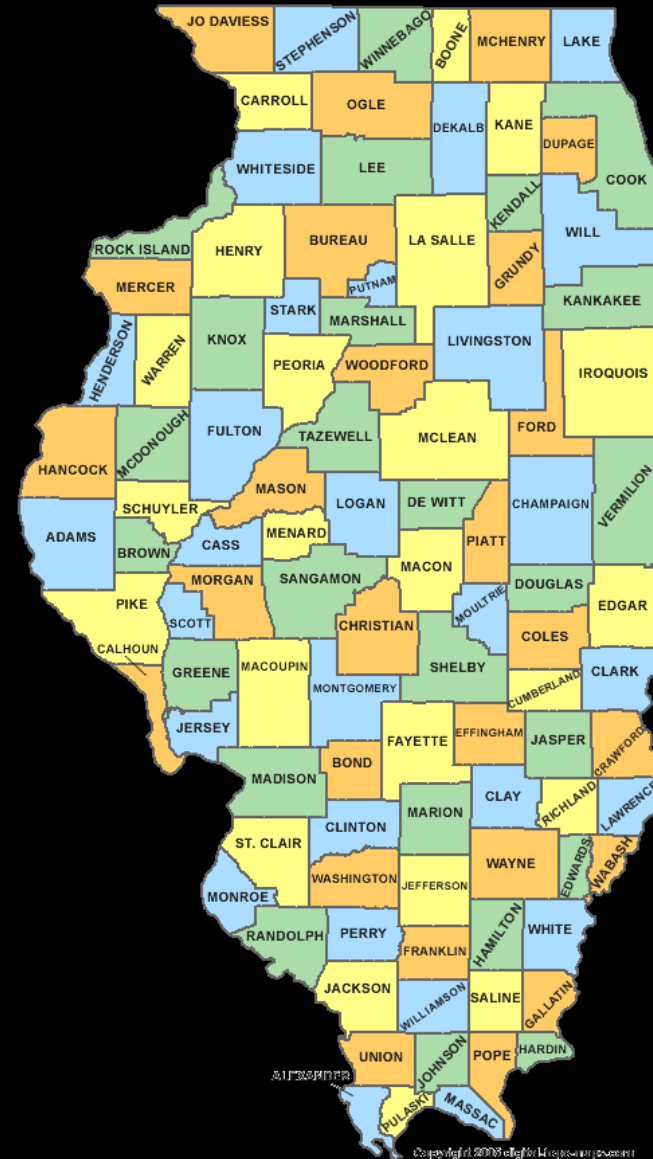
The image features a dark, starry night sky as a background. The stars are small, white, and scattered across the black expanse. In the center of the image, the text "The Sky!" is written in a clean, white, sans-serif font. The text is centered both horizontally and vertically, with the exclamation point being a prominent feature at the end of the phrase.

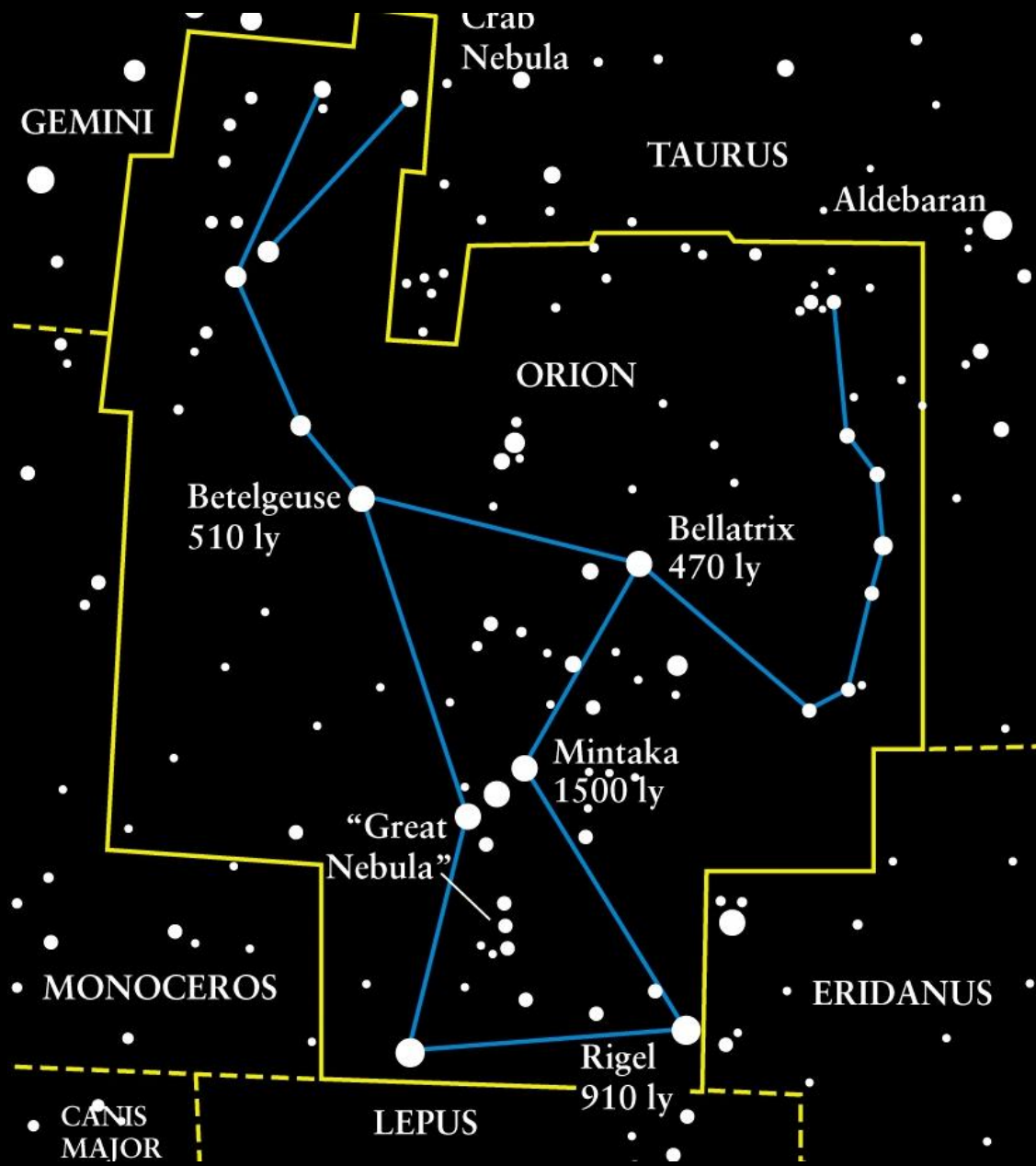
The Sky!



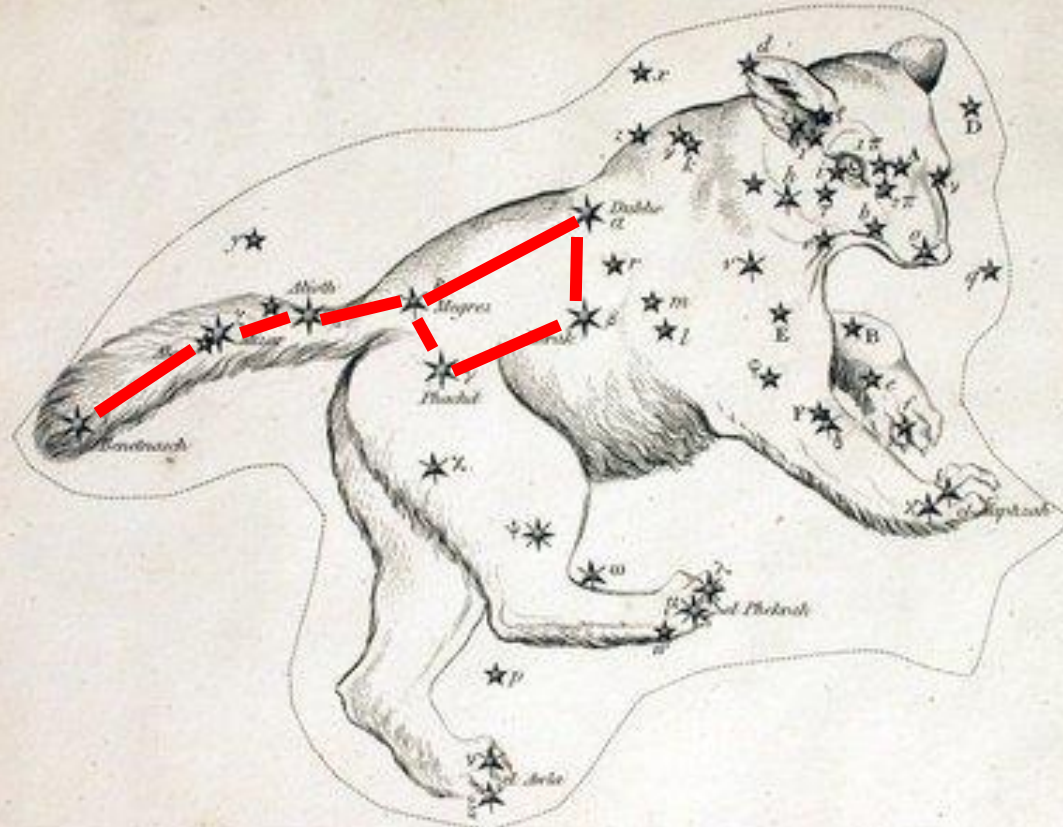
Constellations”

- 88 total with boundaries (like counties)
- An “address” in the sky
- Other stuff – “asterism”





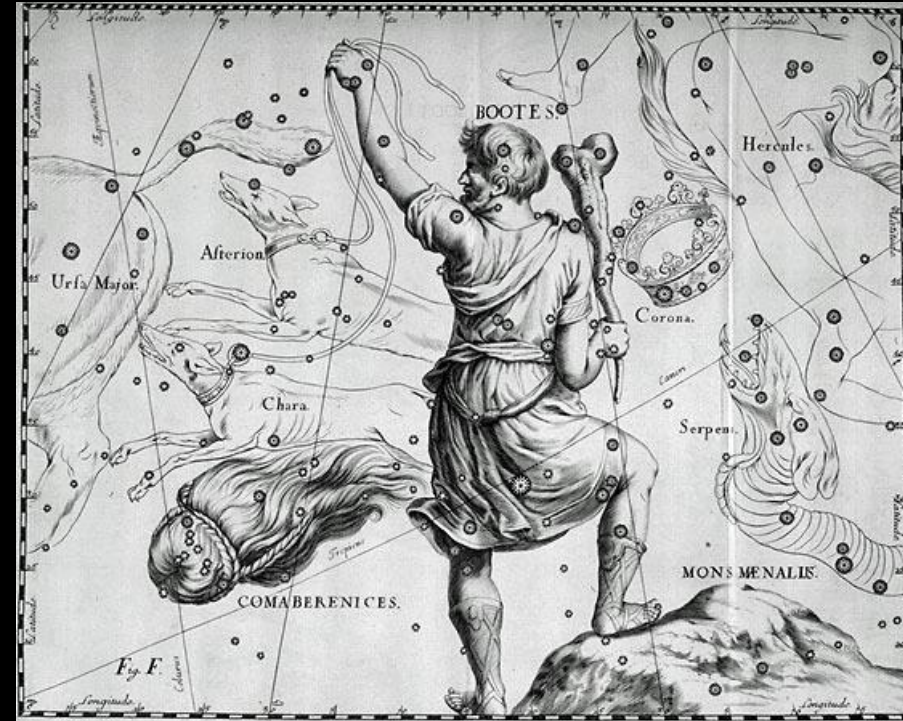
URSA MAJOR.



J. Flamsteed sculp.

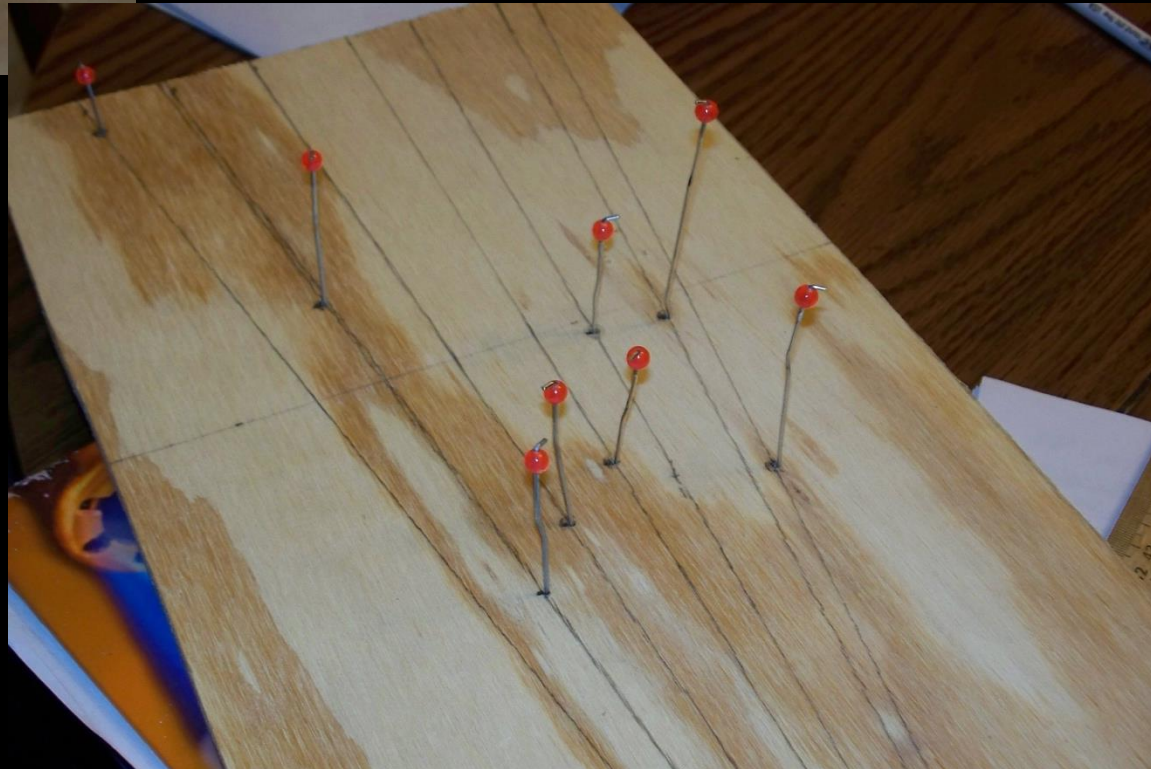
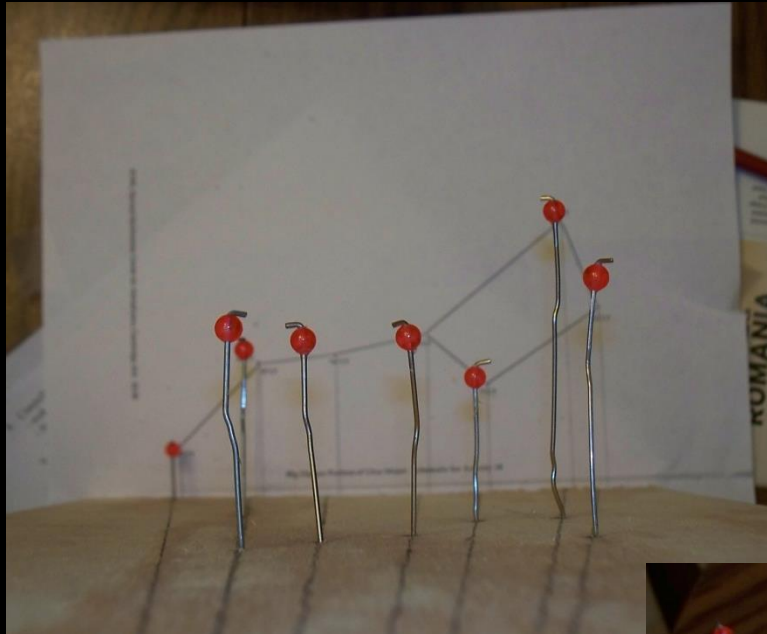
- 28 inanimate objects
- 22 land creatures
- 17 men & women
- 9 birds
- 9 water creatures
- 1 serpent
- 1 insect (a “fly”)
- 1 “head of hair”

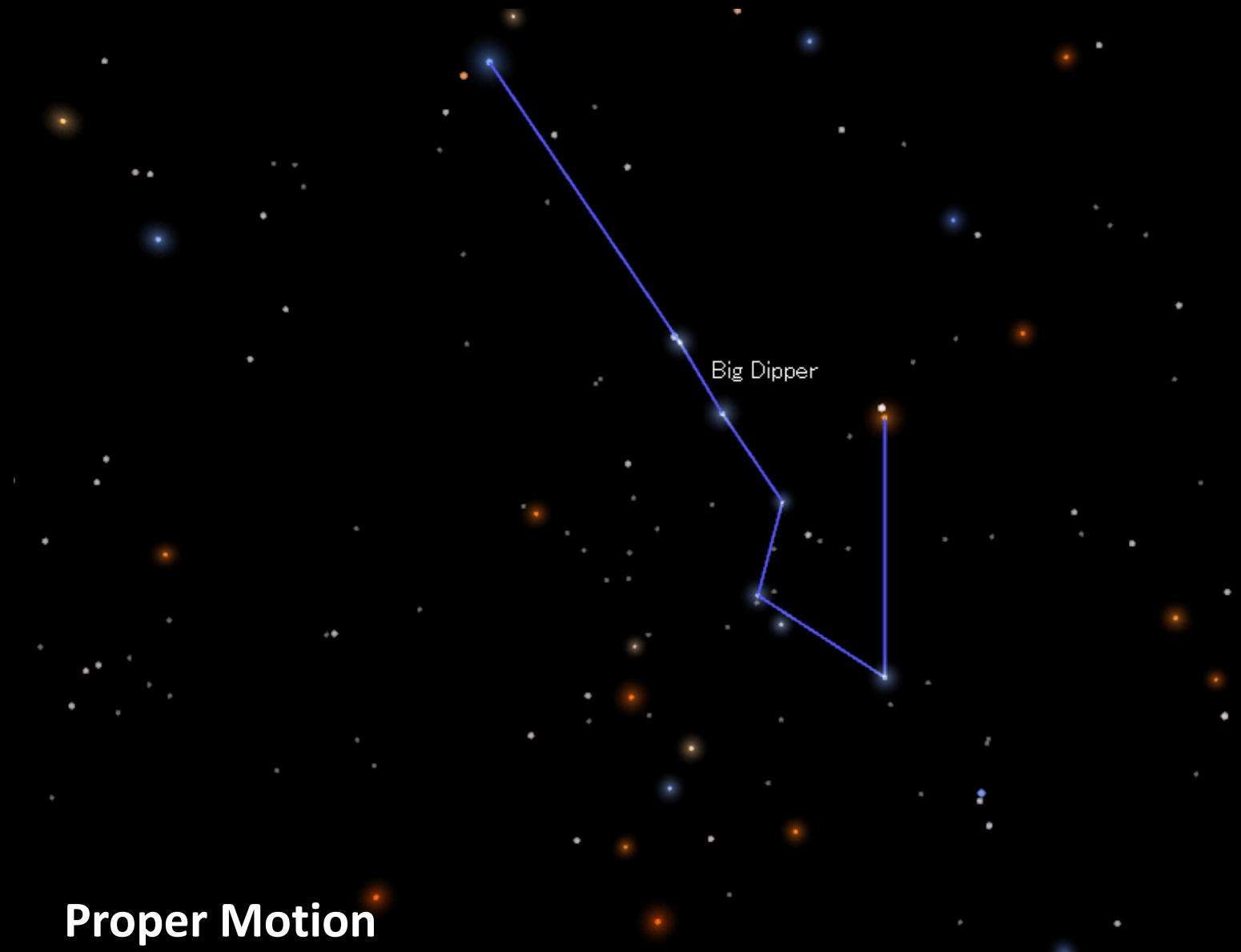
88 total!



Question . . . “why
have constellations?”

3D Big Dipper



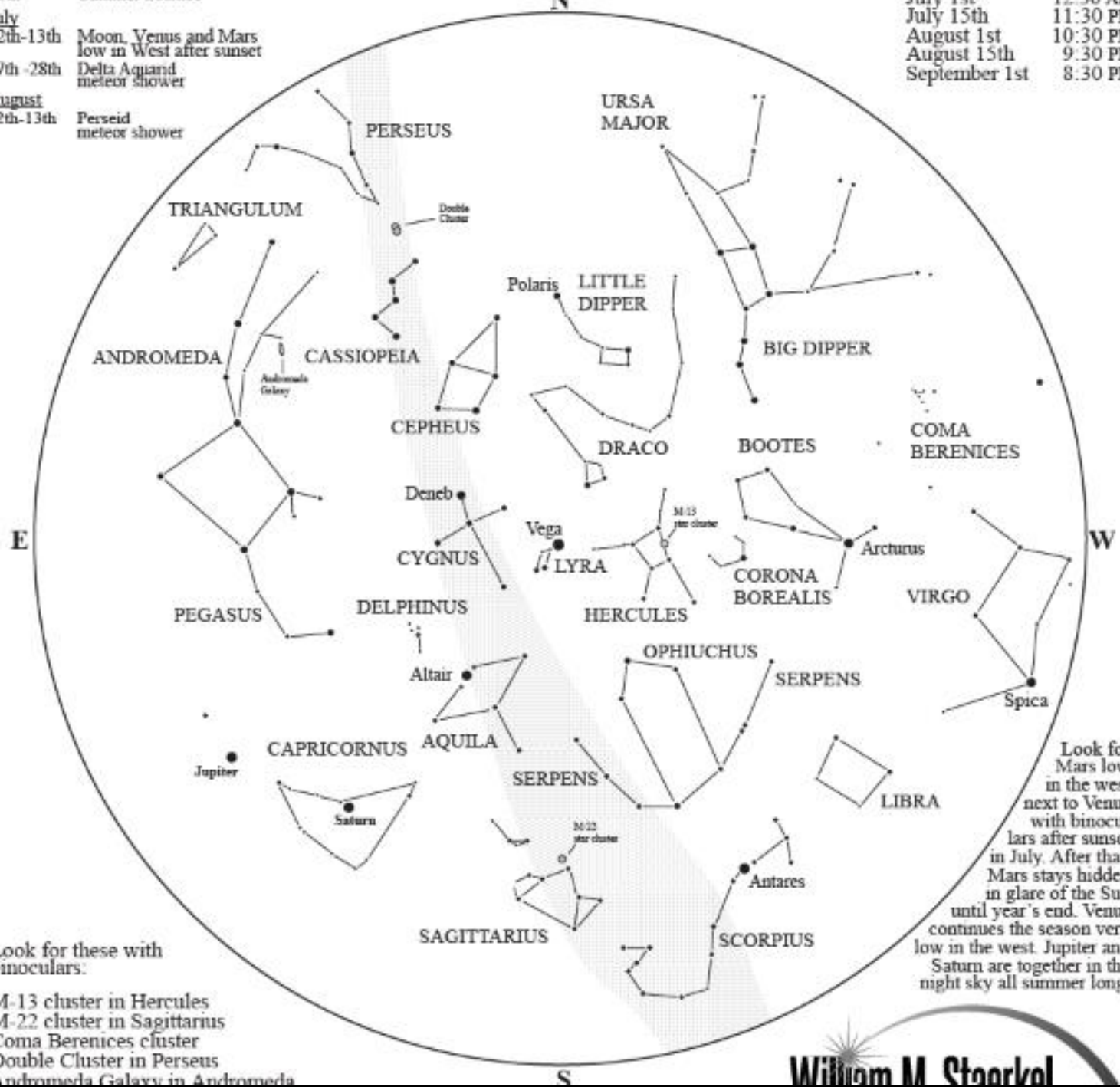


Big Dipper

Proper Motion

July
 12th-13th Moon, Venus and Mars
 low in West after sunset
 27th -28th Delta Aquariid
 meteor shower
 August
 12th-13th Perseid
 meteor shower

July 1st 12:30 AM
 July 15th 11:30 PM
 August 1st 10:30 PM
 August 15th 9:30 PM
 September 1st 8:30 PM



Summer

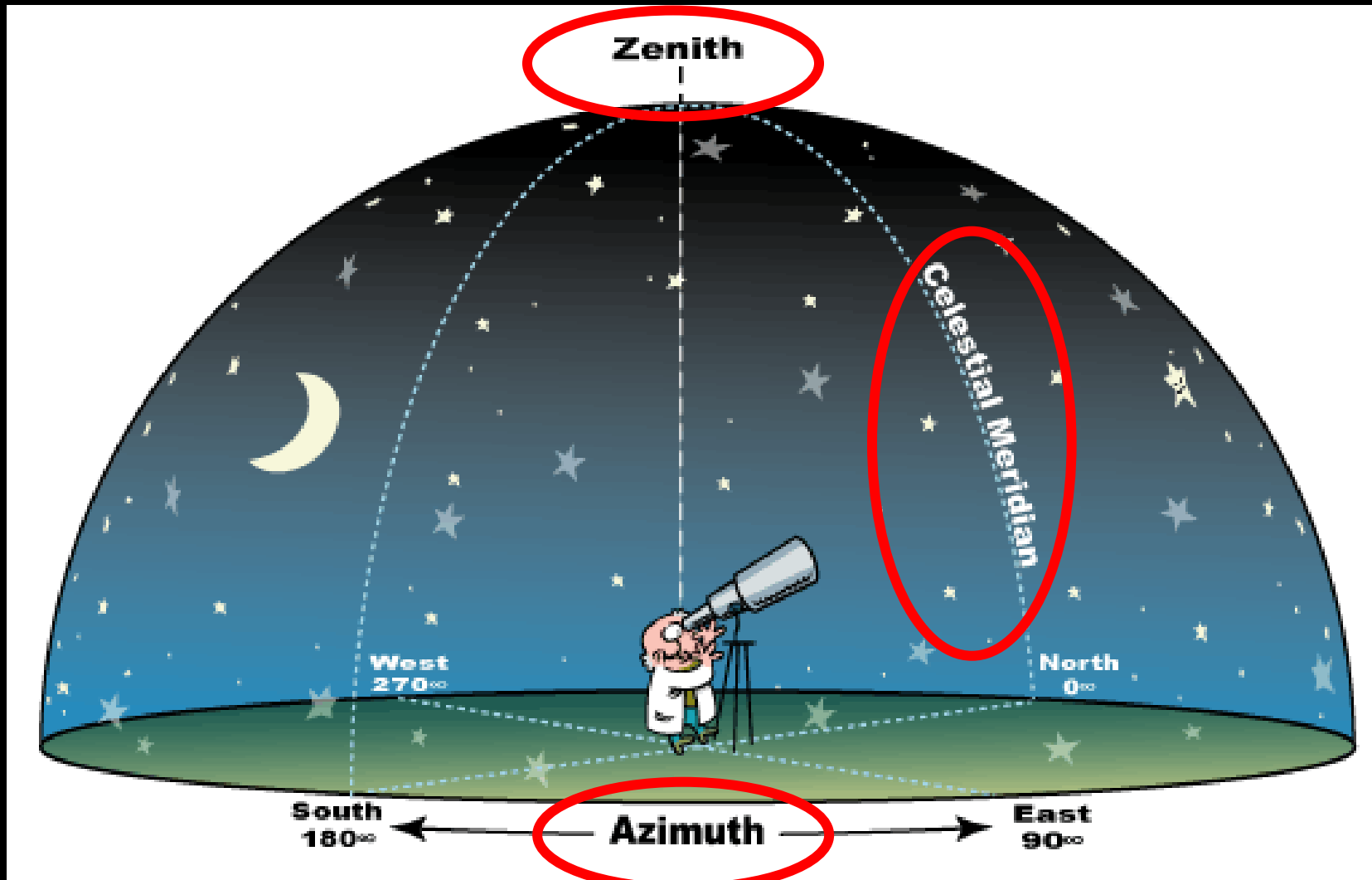
Look for these with
 binoculars:

- M-13 cluster in Hercules
- M-22 cluster in Sagittarius
- Coma Berenices cluster
- Double Cluster in Perseus
- Andromeda Galaxy in Andromeda

Look for
 Mars low
 in the west
 next to Venus
 with binocu-
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 in July. After that,
 Mars stays hidden
 in glare of the Sun
 until year's end. Venus
 continues the season very
 low in the west. Jupiter and
 Saturn are together in the
 night sky all summer long.

HORIZON!





Zenith – the point straight up, directly above your head

Meridian – imaginary arc connecting north to south, running through zenith

Altitude – number of degrees above the horizon. Zenith is 90° .

Azimuth – a measure along the horizon, 0 to 360° (north is zero)

Horizon Line



10 degrees

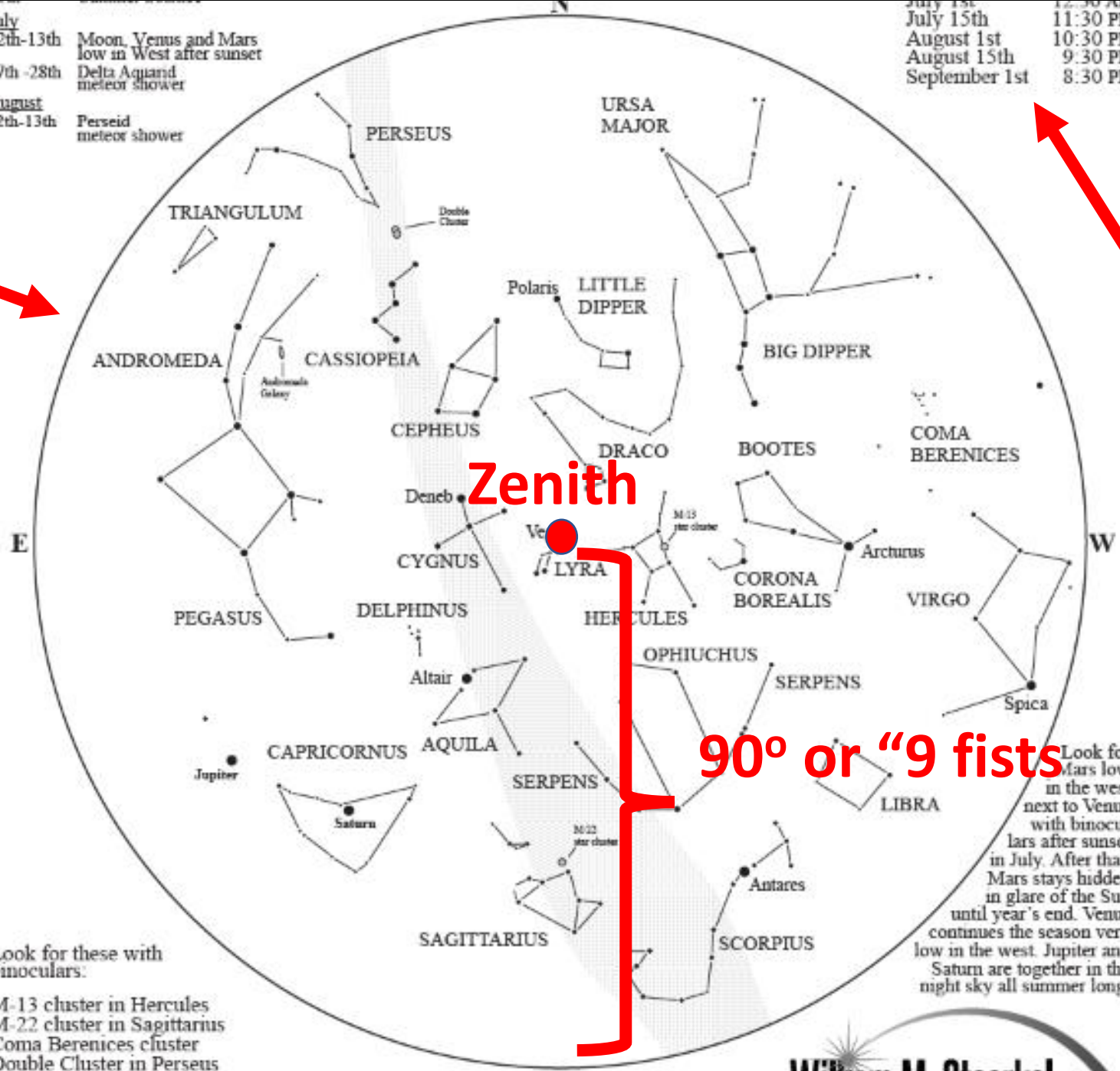


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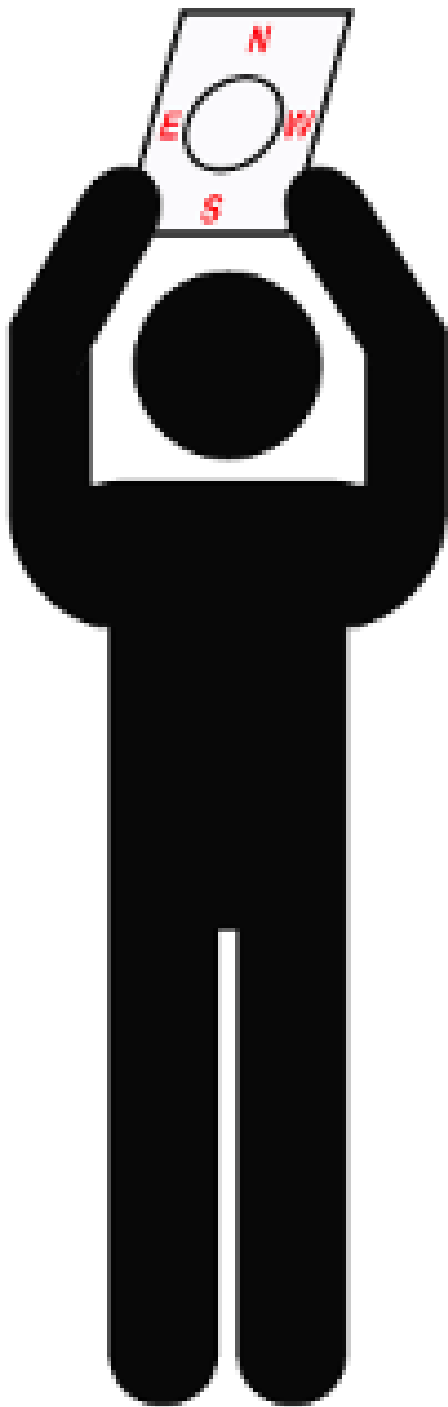
Horizon

Summer

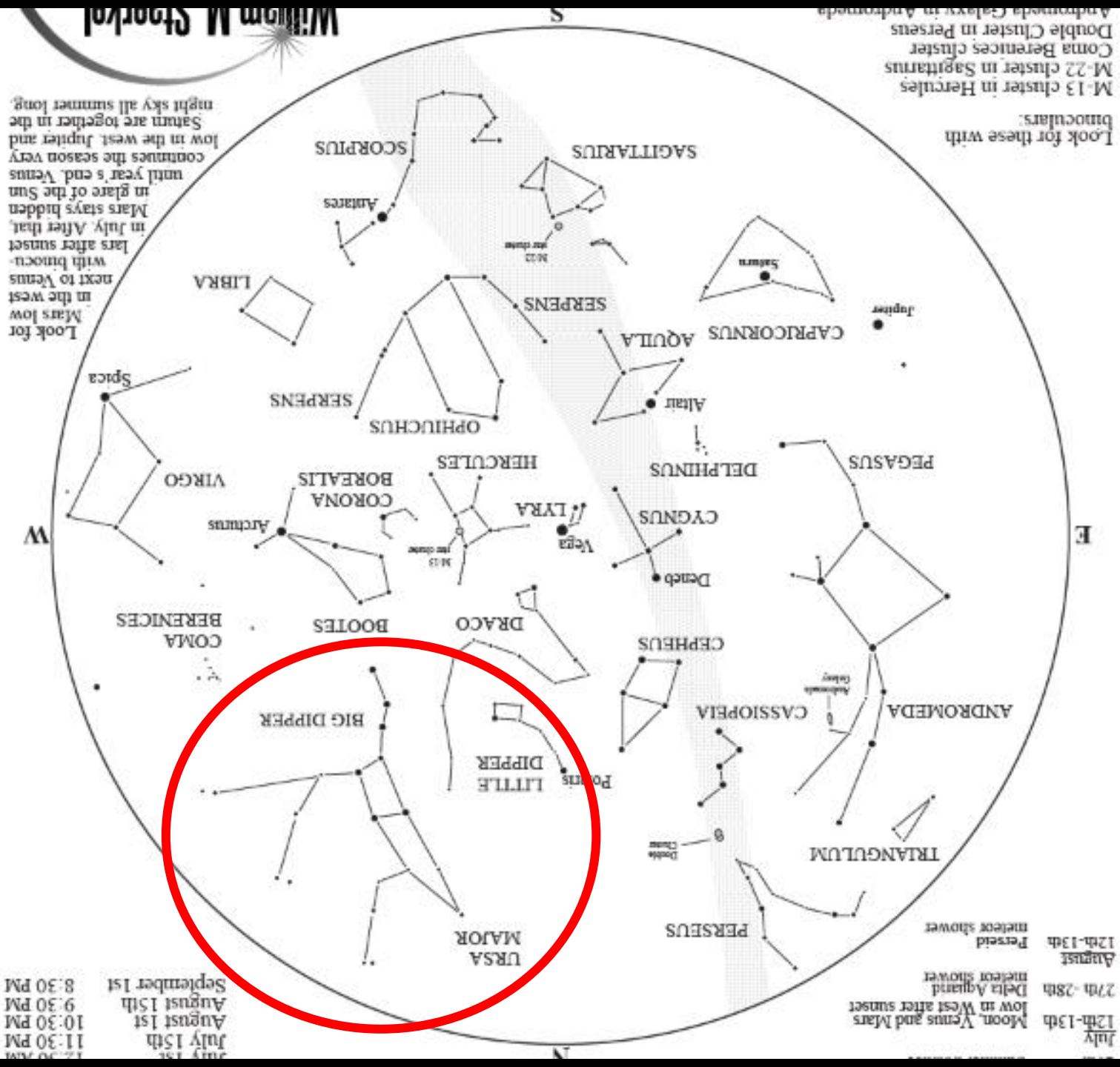


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Summer

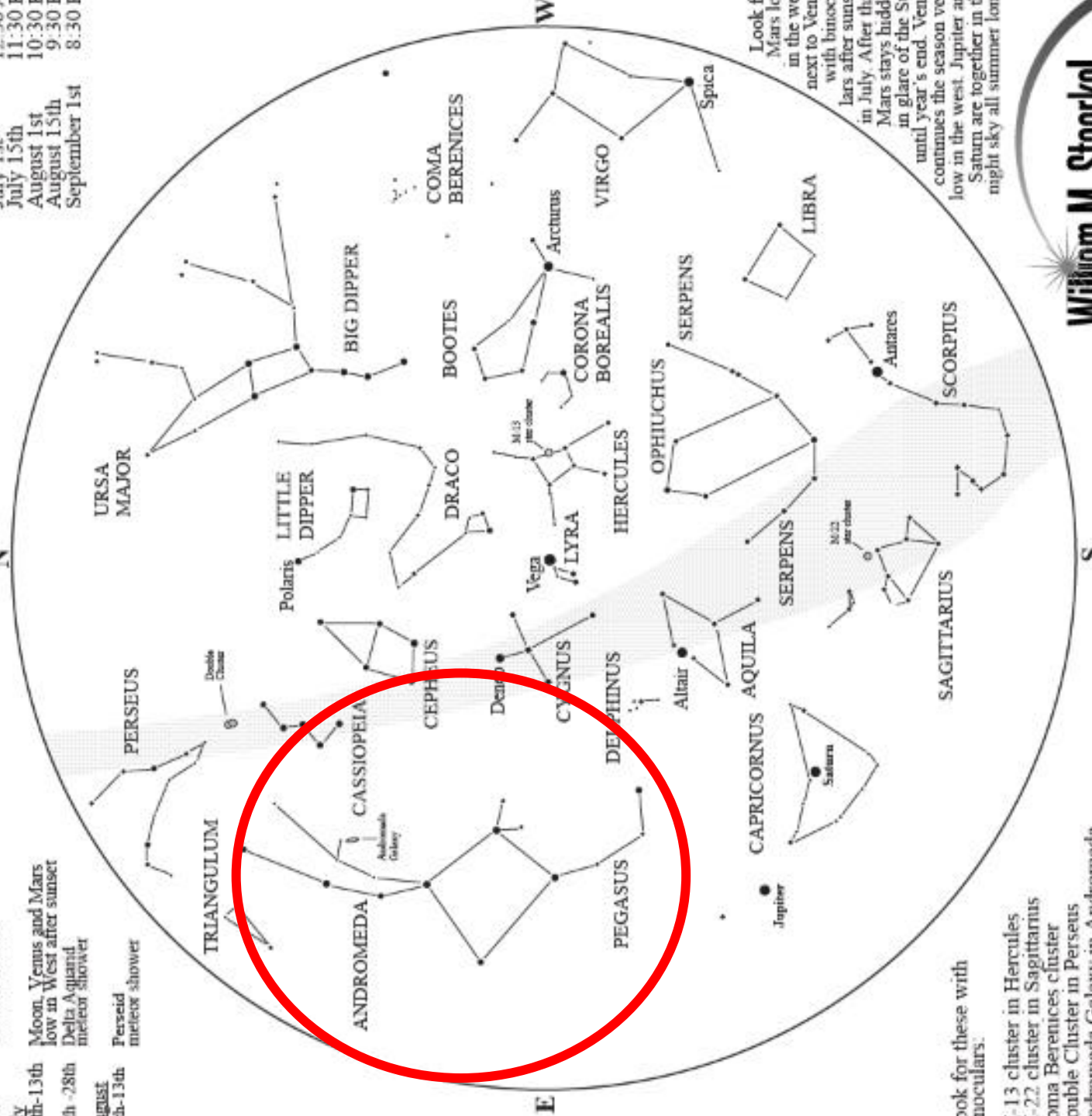


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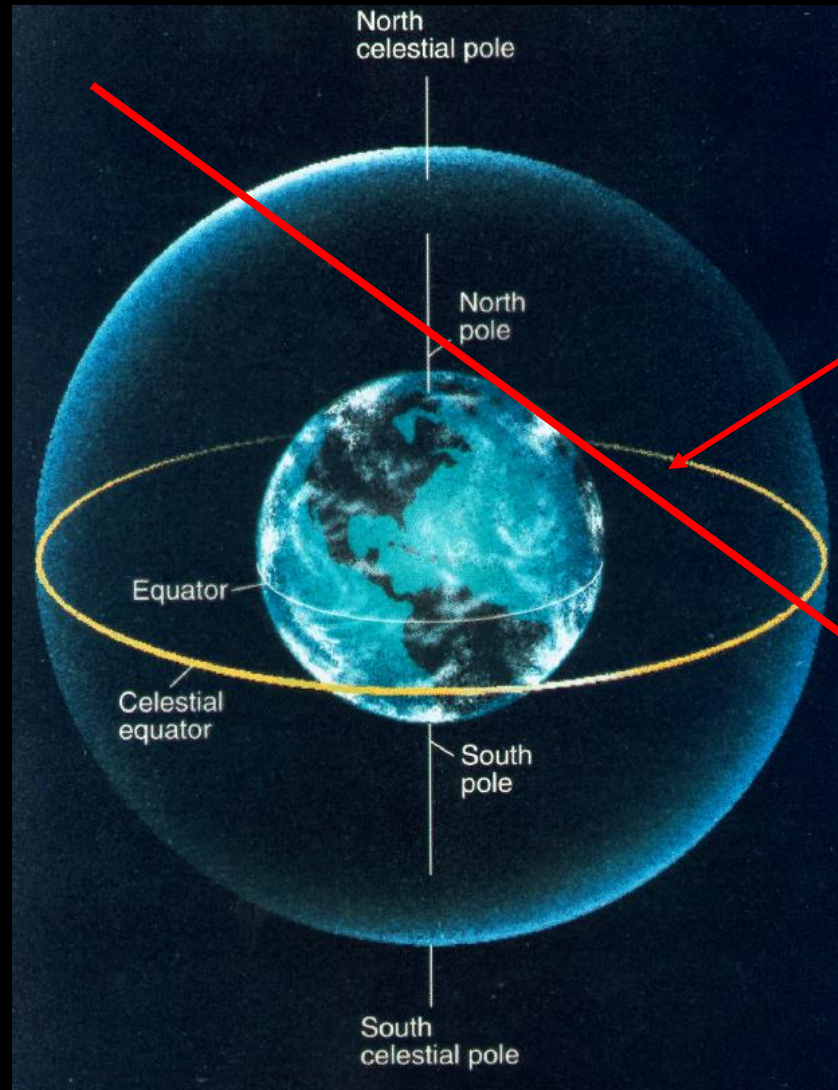
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William M. Storkel

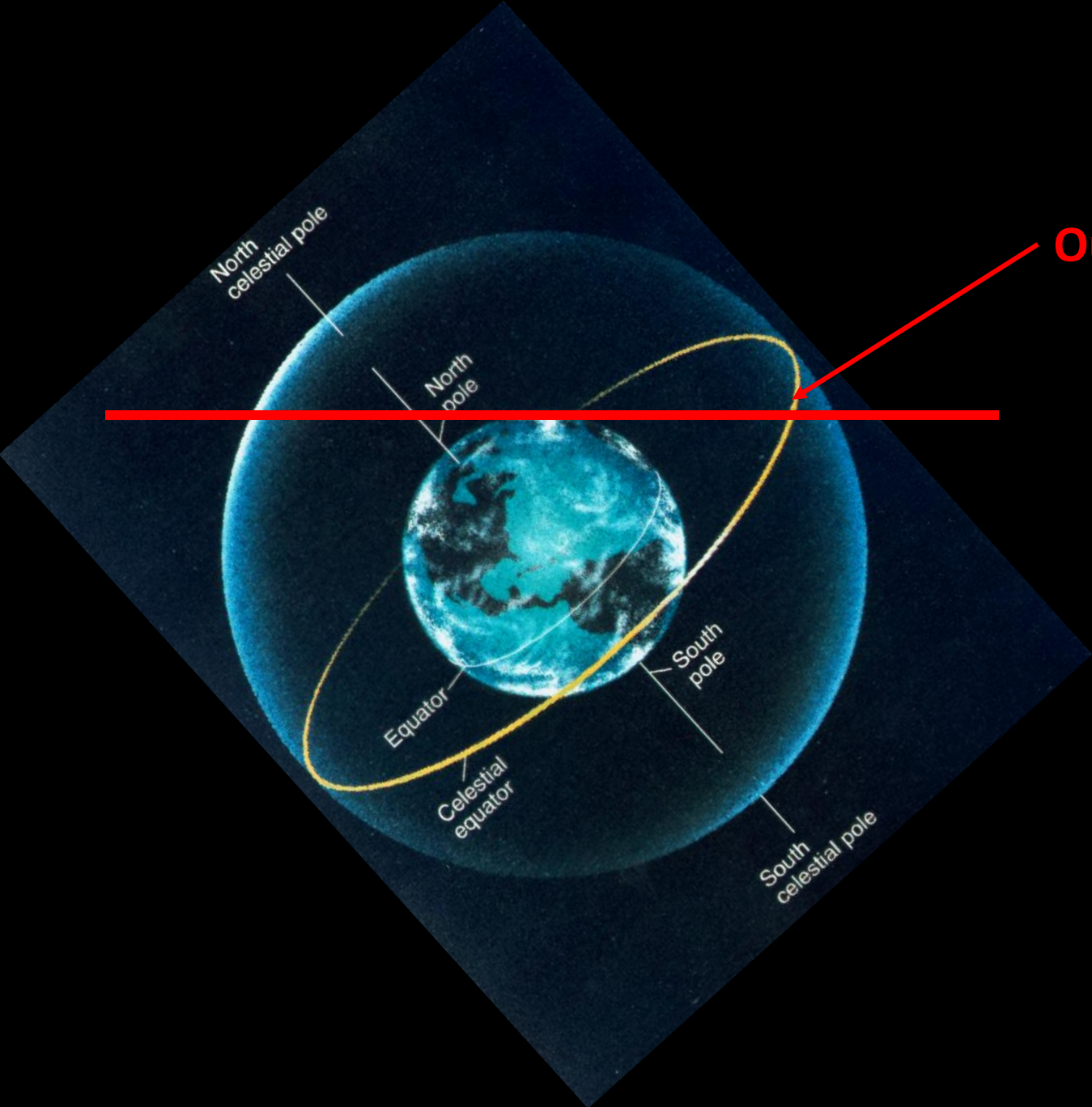


Summer

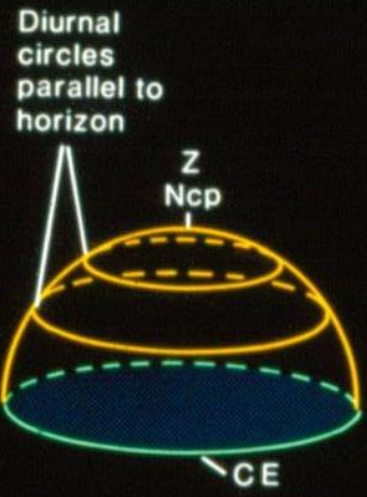
“Celestial Sphere”



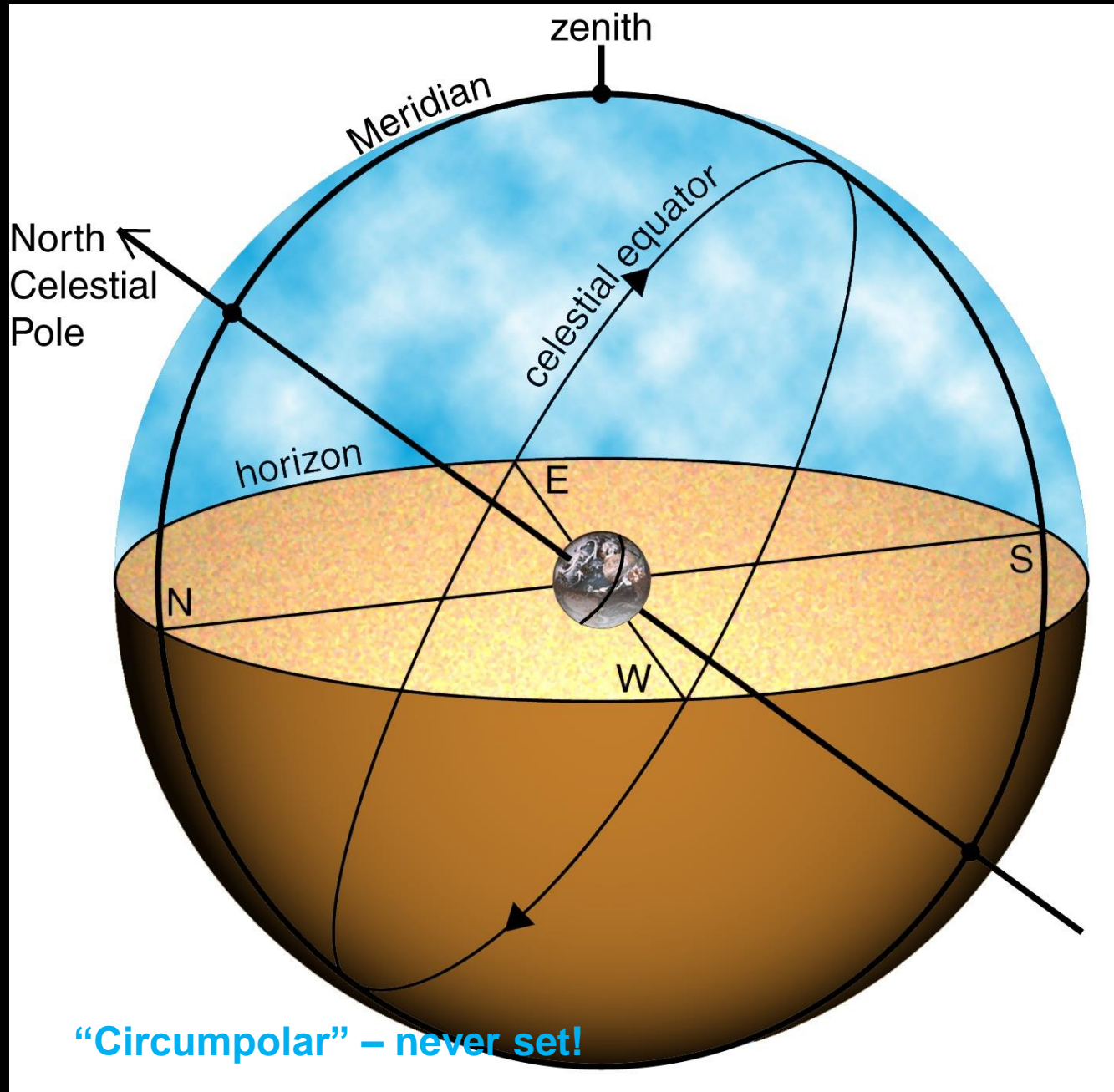
Our horizon



Our horizon



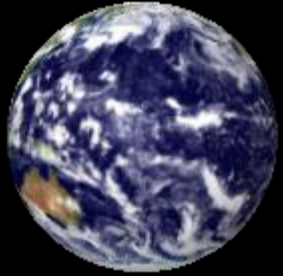
Sky from North Pole



“Circumpolar” – never set!

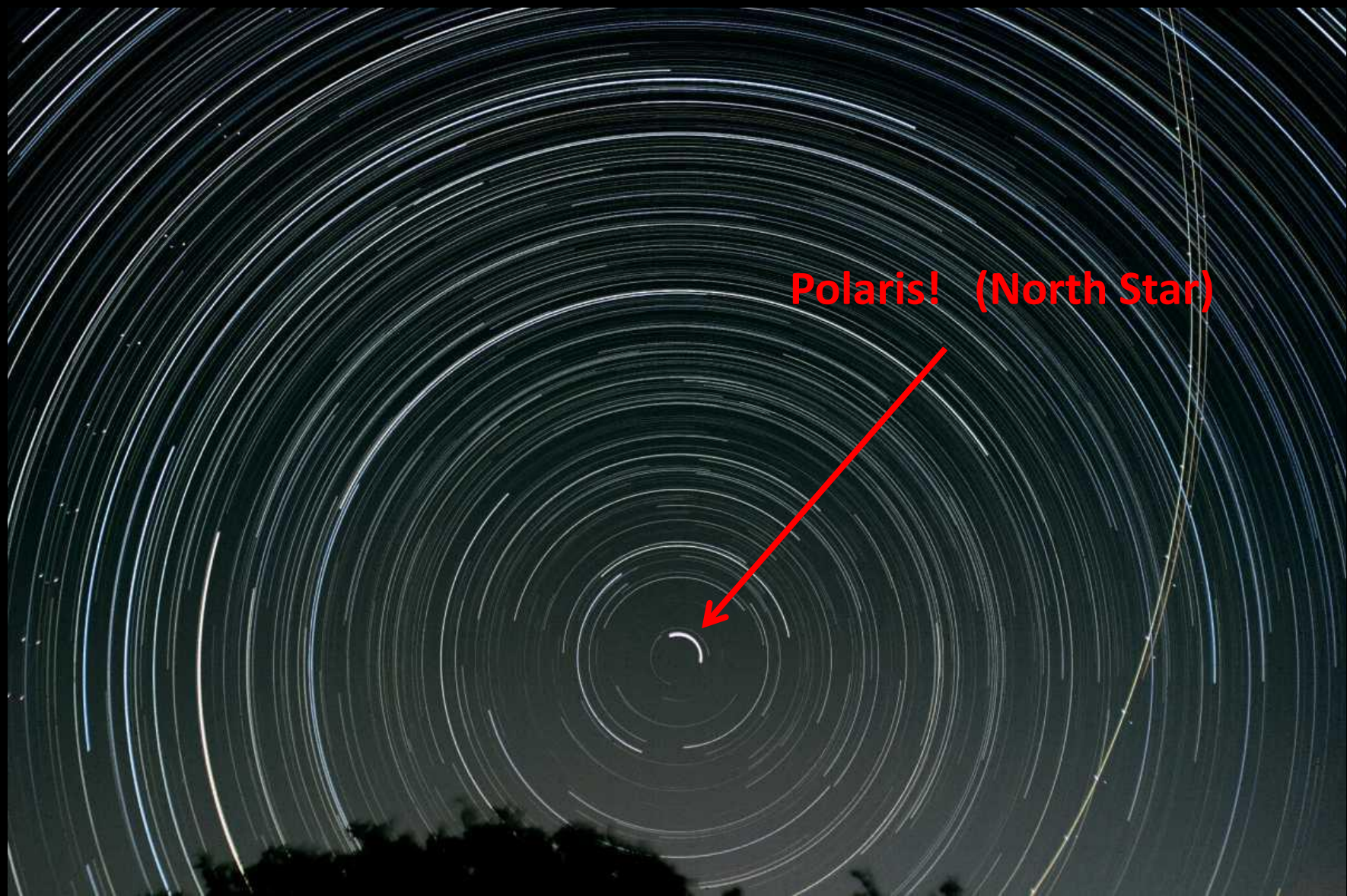


Holy crap . . .they *MOVE!* Why?



Earth turn?

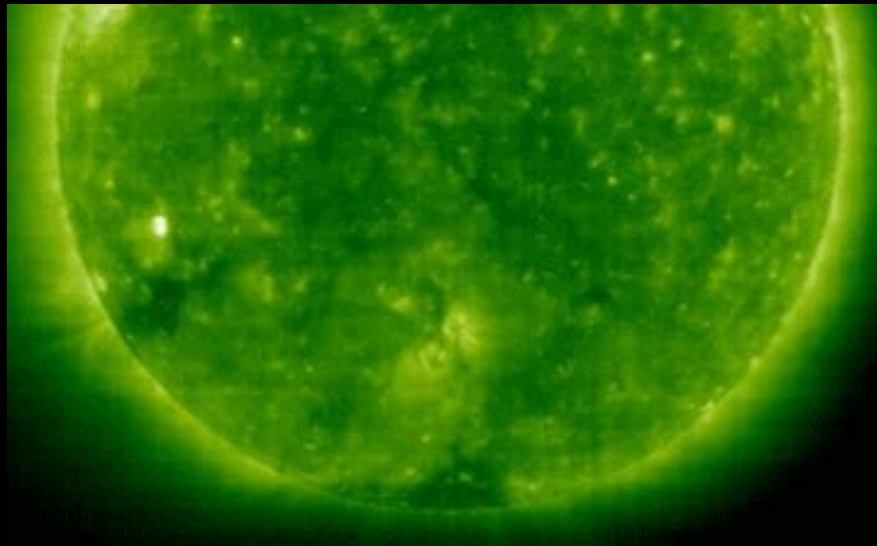
- $24,000 \text{ miles}/24 \text{ hours} = 1000 \text{ mph}???$
- $2\pi (93,000,000 \text{ miles})/1 \text{ year} = 66,000 \text{ mph!}$
- ***YOU GOT TO BE KIDDING ME!***



Polaris! (North Star)

“Motions” of the Sun . . .

- Chariot (India, Norse, Greeks)
- Boat (Egypt)
- Flying with wings (Assyrians, Persians)
- On foot with torch (Chumash, Australians)

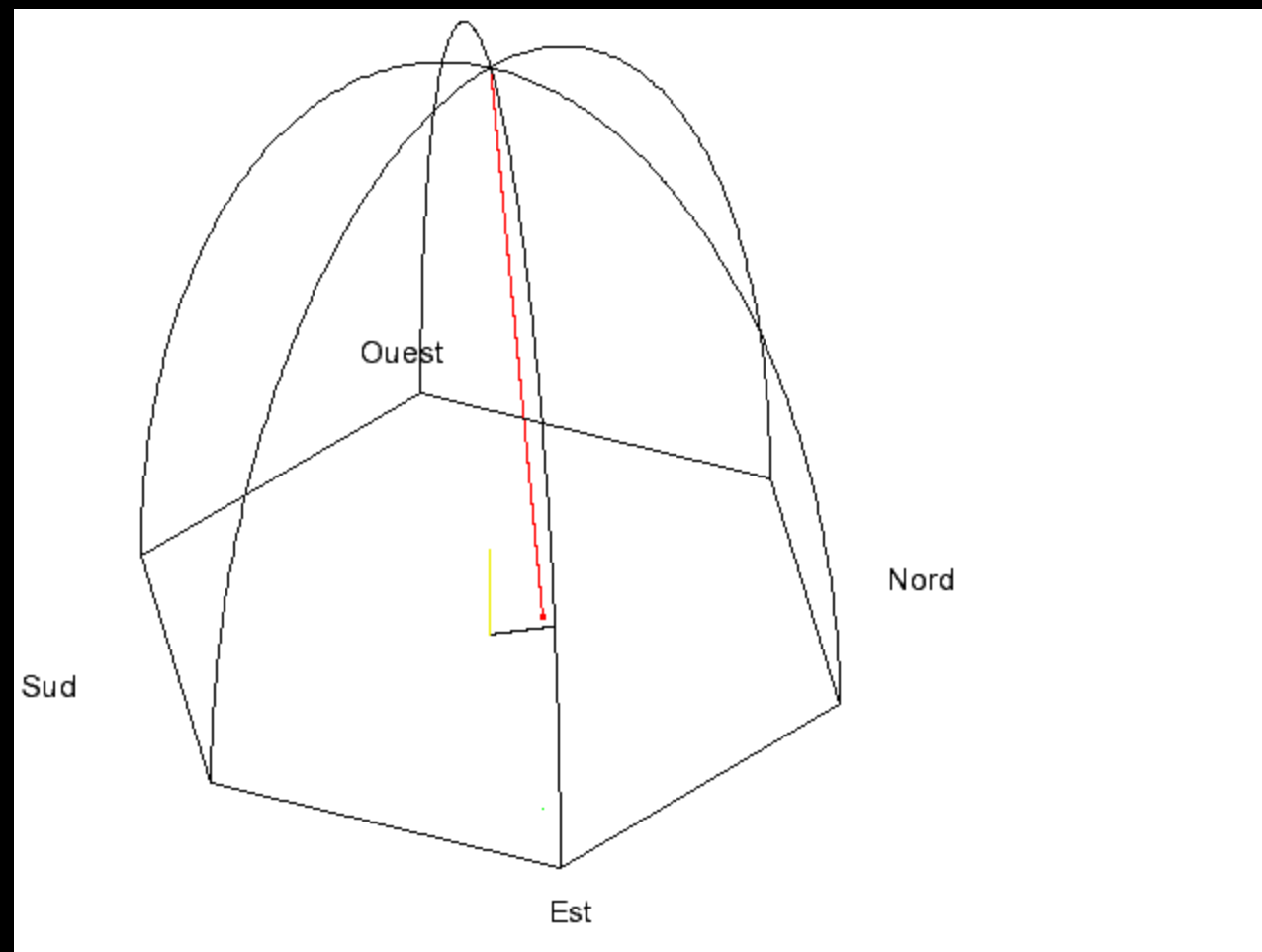


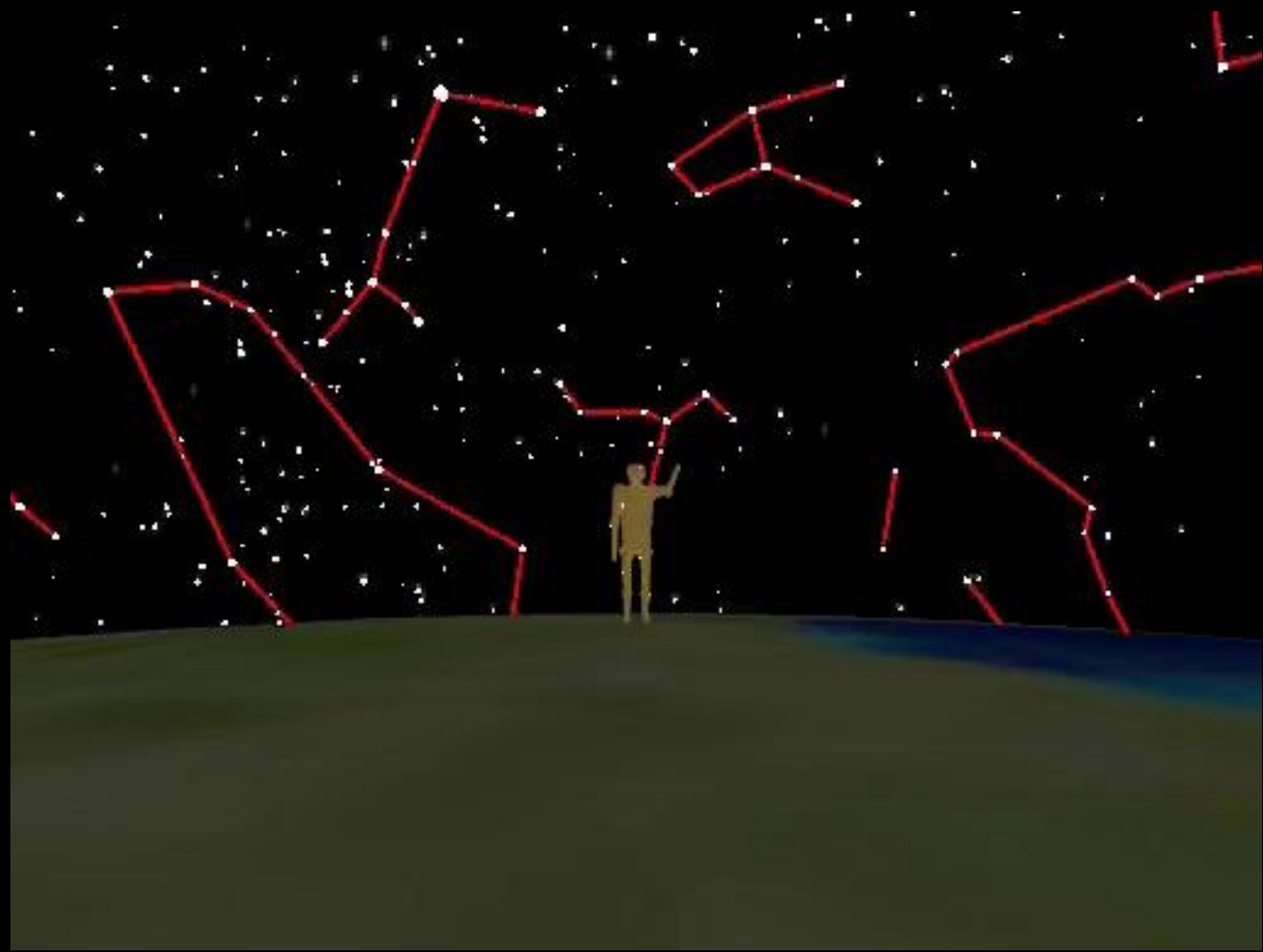


W

E

You want proof?





Rotation Of Earth Plunges Entire North American Continent Into Darkness

NEWS • Patriotism • ISSUE 42•09 • Feb 27, 2006



1.4K



37



37

NEW YORK—Millions of eyewitnesses watched in stunned horror Tuesday as light emptied from the sky, plunging the U.S. and neighboring countries into darkness. As the hours progressed, conditions only worsened.



Satellite view at 4:50 p.m. EST shows the sun disappearing from the sky.

At approximately 4:20 p.m. EST, the sun began to lower from its position in the sky in a westward trajectory, eventually disappearing

below the

horizon. Reports of this global emergency continued

to file in from across the continent until 5:46 p.m. PST, when the entire North American mainland was officially declared dark.

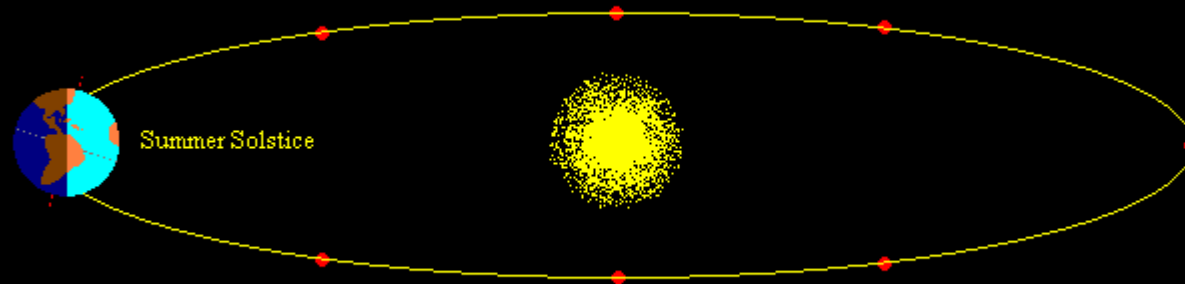
As the phenomenon hit New York, millions of motorists were forced to use their headlights to navigate through the blackness. Highways flooded with commuters who had left work to hurry home to their families. Traffic was bottlenecked for more than two hours in many major metropolitan areas.

Across the country, buses and trains are operating on limited schedules and will cease



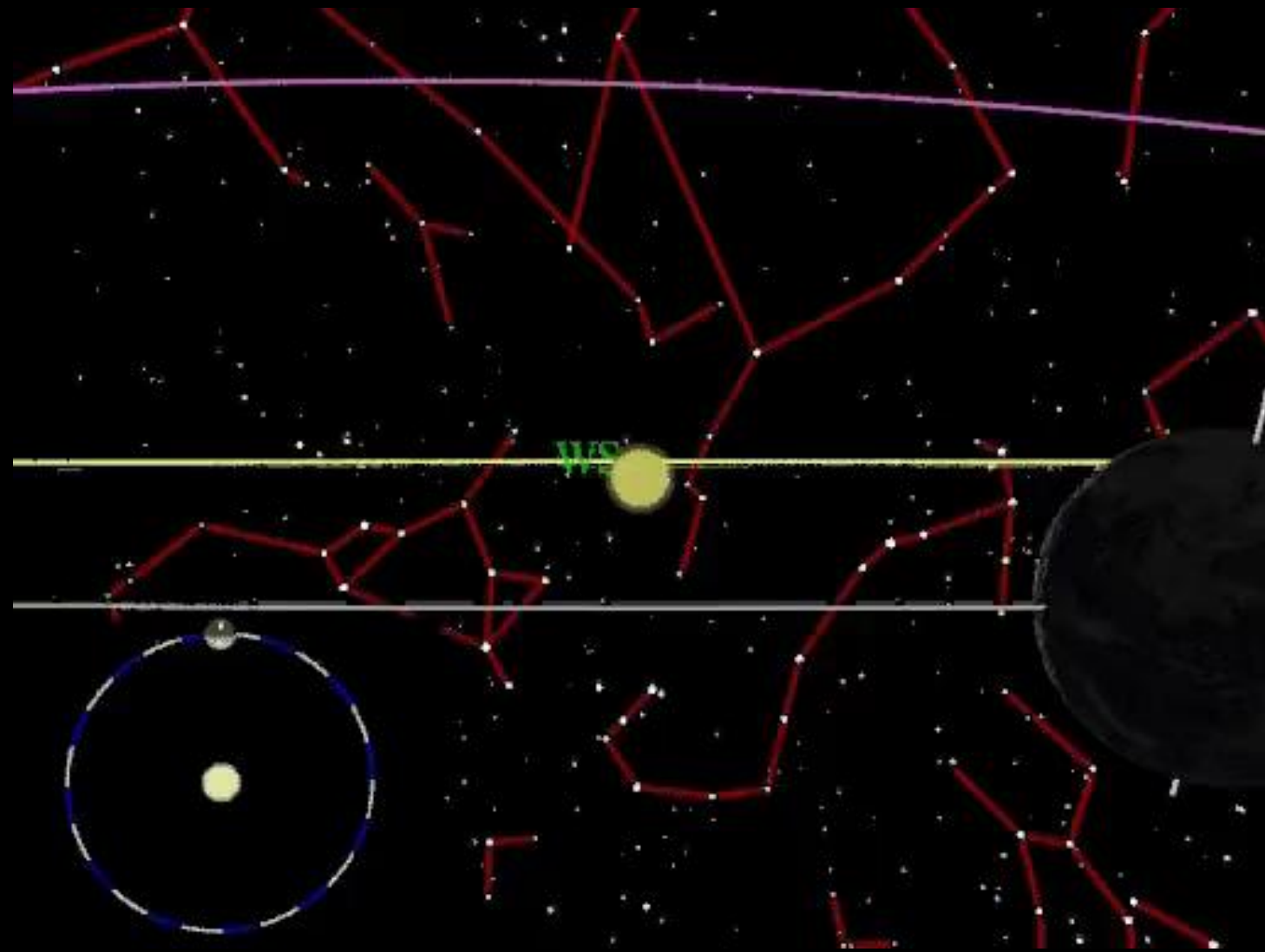
Motions of the Earth

- Rotation
- Revolution

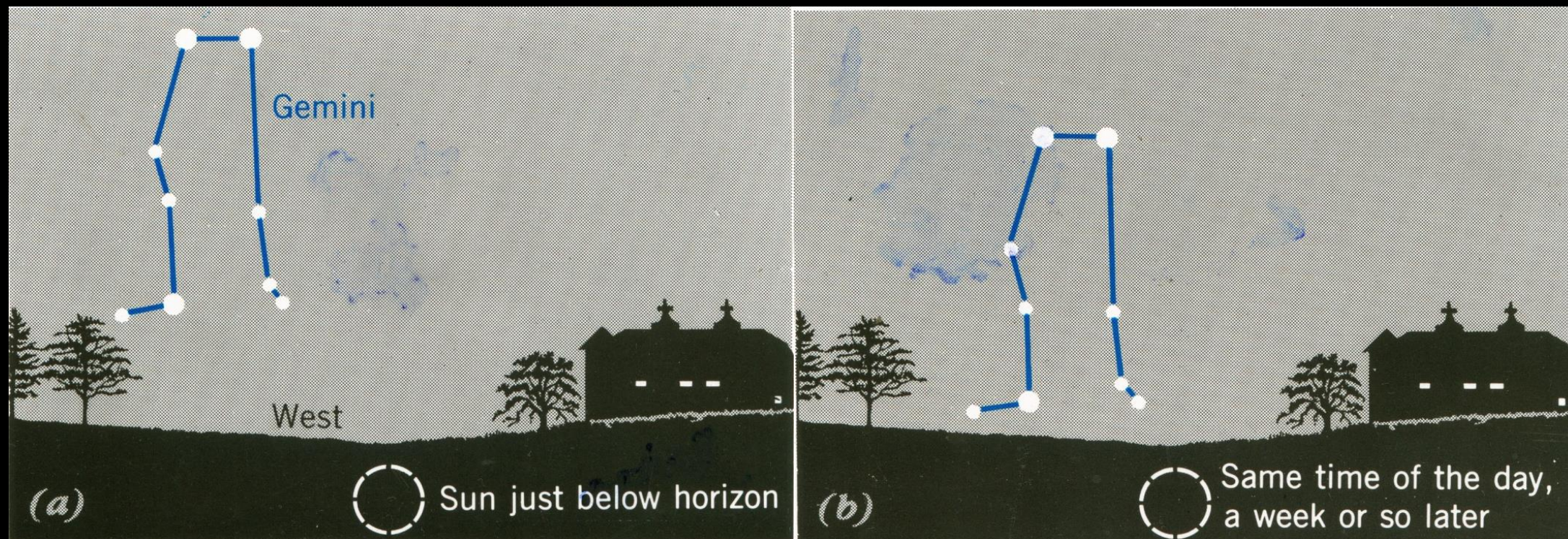


**William M. Staerkel
PLANETARIUM**





But how do you *really* know?



Zodiac – “circle of animals”

- Originated in Mesopotamia (87 BC)
- Age of Aries, Pisces, then Aquarius (2514 AD)
- “Ecliptic” – *apparent* path of the Sun



YOUR HOROSCOPE

Your birthday Tuesday. If you're alert and enterprising in the year ahead, you'll have an excellent chance at finding a second source of income that will blend compatibly with your present mode of earning.

Gemini (May 21-June 20) A difficult objective can be achieved today, but you may rationalize otherwise and not put forth the effort necessary to come out victorious. You'll never know until you try.

Cancer (June 21-July 22) If you don't practice what you preach today, others won't be interested in your philosophy or suggestions. It's the example that counts.

Leo (July 23-Aug. 22) It behooves you to be money- and/or commercially-minded today; there's a possibility you could turn a profit from a source other than your usual one. Keep your eyes open.

Virgo (Aug. 23-Sept. 22) If you show a willingness to cooperate today, people with whom you'll be involved will do the same. This is

a good starting point for pleasant associations.

Libra (Sept. 23-Oct. 23) In order to gratify your inner urges today, it's important that you get involved in something you deem to be constructive and worthwhile. Work must have value.

Scorpio (Oct. 24-Nov 10) Generally speaking, this should be a rather enjoyable day for you. Something you thought might cause you complications is not likely to manifest itself.

Ophiuchus (Nov. 10-Dec. 5) You will start World War III by accident, and, what's worse, your feet stink beyond belief. Don't believe everything you read!

Sagittarius (Dec. 5 -Dec. 21) Conditions are basically favorable today, and you should take advantage of these trends. Be sure to finalize to your satisfaction any projects you begin.

Capricorn (Dec. 22-Jan. 19) You could need a variety of activities to keep you happy today. Don't be afraid to take on several assign-

ments, because this is one of those rare times when more is better.

Aquarius (Jan. 20-Feb. 19) Your possibilities for personal gain look more encouraging today than they may look tomorrow. Don't leave any loose threads dangling so you can trip over them later.

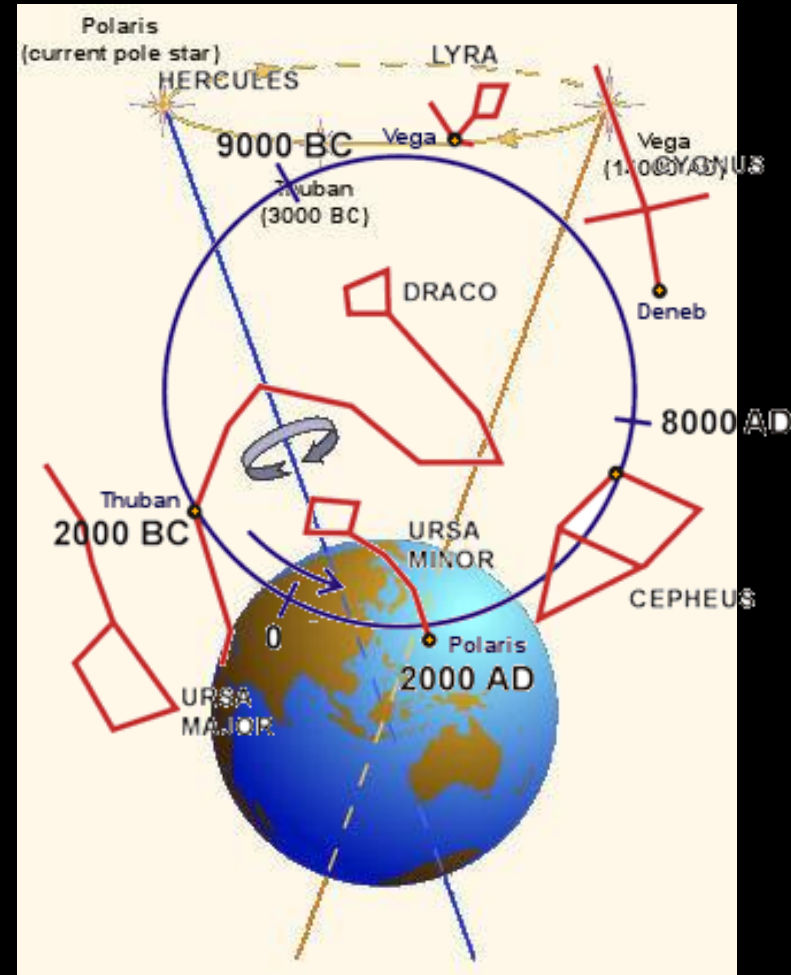
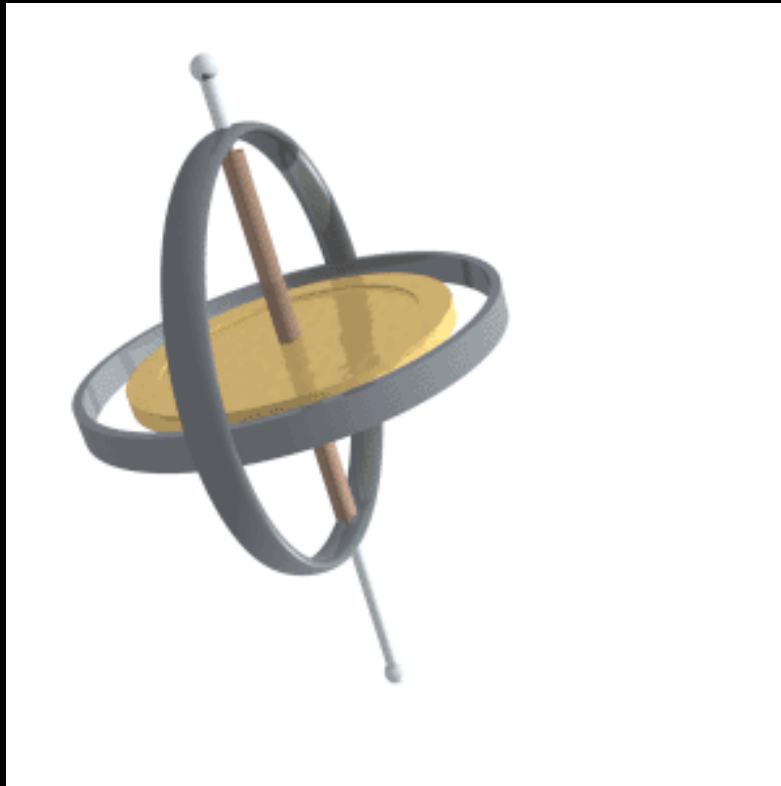
Pisces (Feb. 20-March 20) What you hope to accomplish can be achieved today, provided you are self-reliant and independent. Have complete faith in your own capabilities.

Aries (March 21-April 19) Your perceptions could provide you with valuable information today that can't be derived through a process of logical reasoning. To be successful, though, use both.

Taurus (April 20-May 20) Make your own determinations today regarding someone new you may meet. The fact that this individual doesn't get along too well with one of your friends shouldn't affect your evaluations.

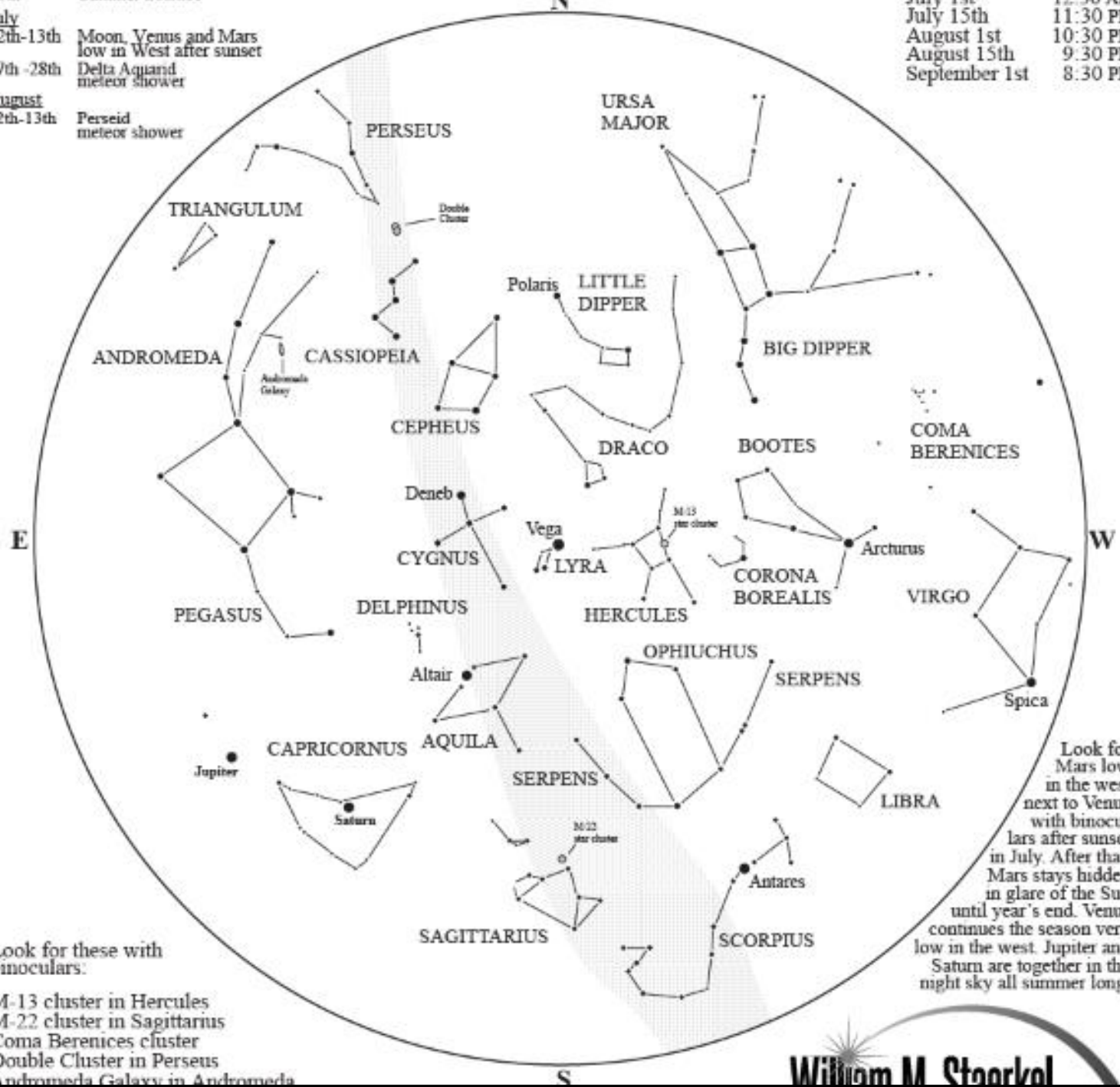
Show em on Stellarium!

Another motion . . . Precession



July
 12th-13th Moon, Venus and Mars
 low in West after sunset
 27th -28th Delta Aquariid
 meteor shower
 August
 12th-13th Perseid
 meteor shower

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Summer

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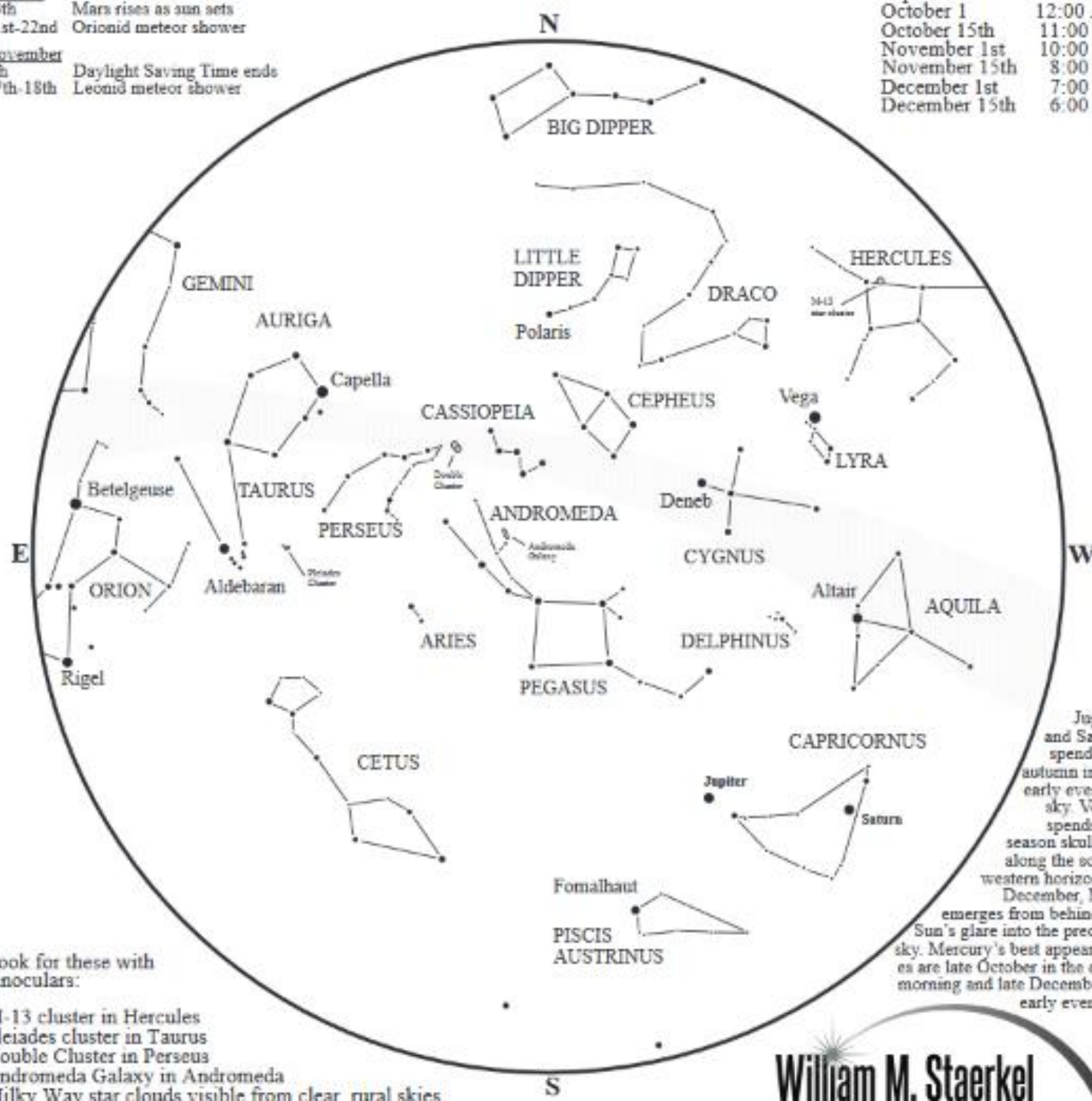
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 Saturn are together in the
 night sky all summer long.

13th — Mars rises as sun sets
 21st-22nd Orionid meteor shower

November
 7th Daylight Saving Time ends
 17th-18th Leonid meteor shower

October 1 12:00 AM
 October 15th 11:00 PM
 November 1st 10:00 PM
 November 15th 8:00 PM
 December 1st 7:00 PM
 December 15th 6:00 PM

Fall



Look for these with binoculars:

- M-13 cluster in Hercules
- Pleiades cluster in Taurus
- Double Cluster in Perseus
- Andromeda Galaxy in Andromeda
- Milky Way star clouds visible from clear rural skies

Jupiter and Saturn spend this autumn in the early evening sky. Venus spends the season skulking along the southwestern horizon. In December, Mars emerges from behind the Sun's glare into the predawn sky. Mercury's best appearances are late October in the early morning and late December in early evening.

William M. Staerke

Effects of Latitude

tonight from C-U



North of Hudson Bay



Cancun, Mexico

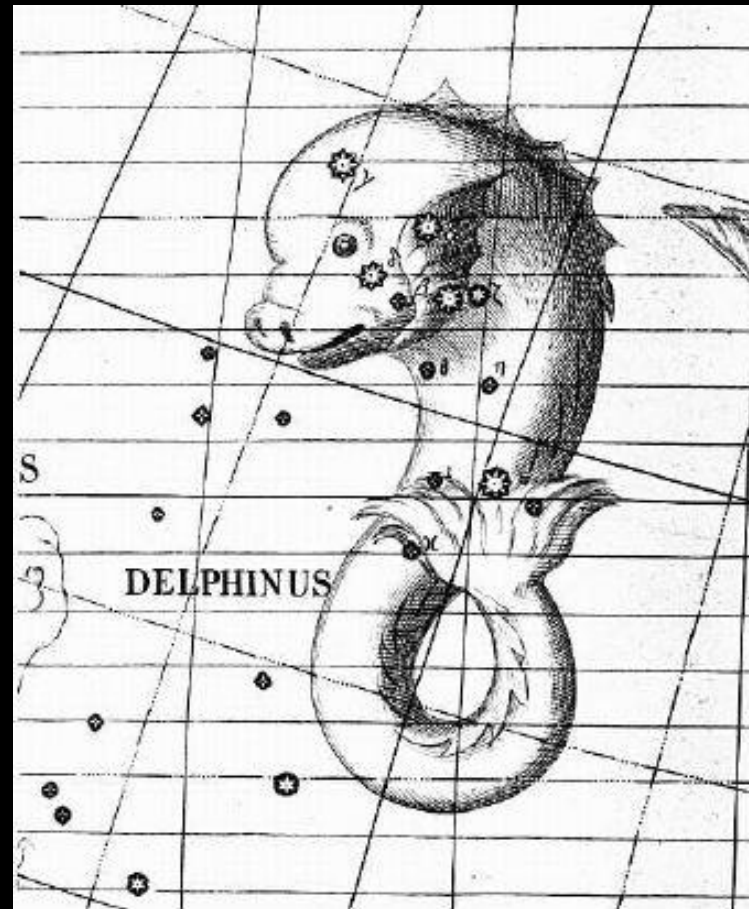


Lima Peru



Naming stars?

- Nicholas Venator (assistant, Palermo Observatory)
- “Salohcin” & “Rotanev”
in Delphinus
- “Want to buy a blade of
grass in my front yard?”



Naming Stars

- About 200 with **popular names** (some Greek, many were shortened from Arabic)
- Johannes Bayer (17th century) – assigned Greek letters, usually in order of brightness
- John Flamsteed (18th century) – assigned numbers, west to east
- “Bright Star Catalog” – 9000 stars, west to east on celestial sphere, updated at Harvard
- "Bonner Durchmusterung" (the Bonn Survey) – fainter stars
- Henry Draper Catalog
- Hipparcos Catalog