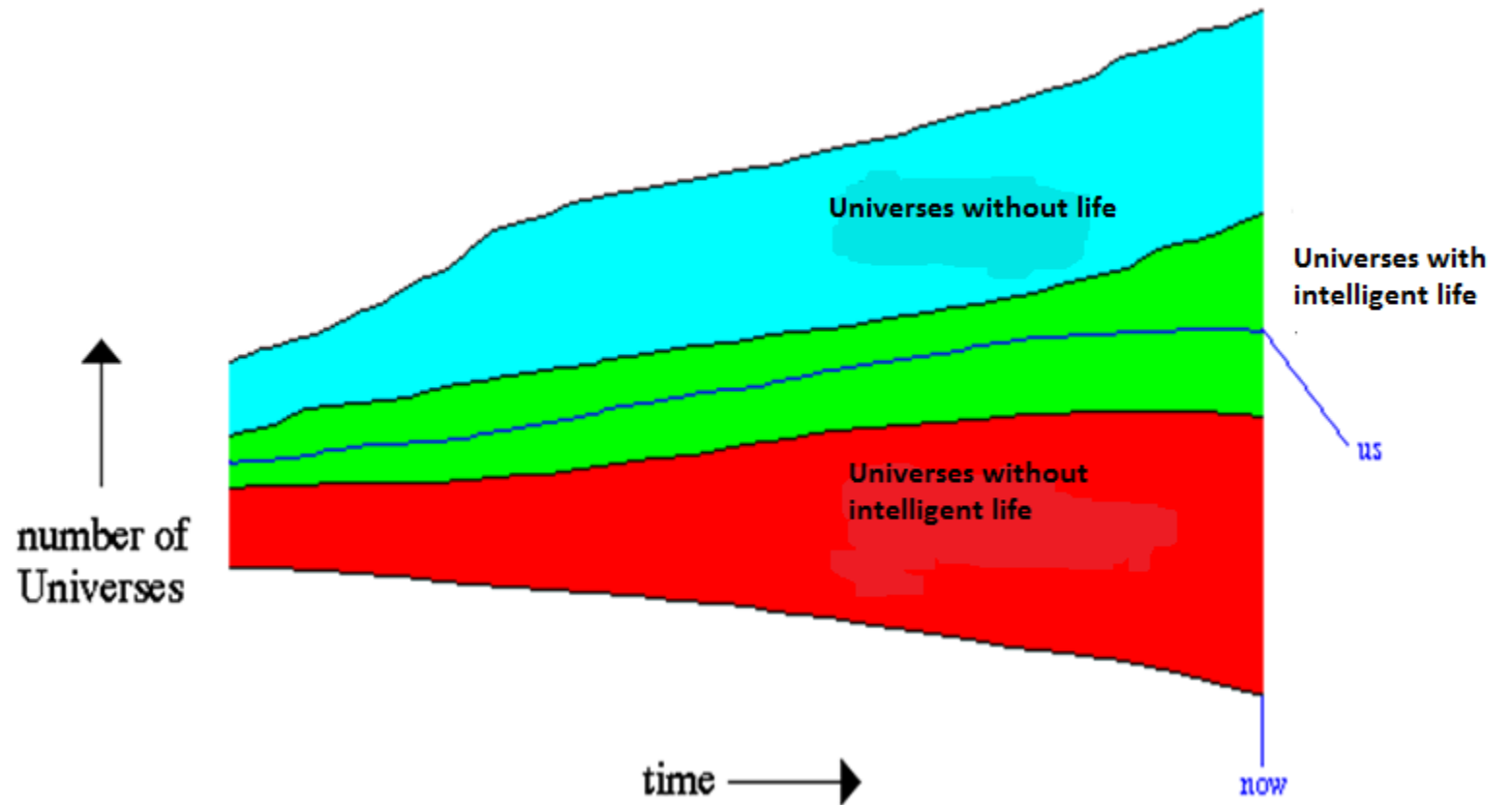


Universes...

I like to start with the multi-verse and work my way back to this Universe, then the Milky Way... and finally my spaceship – I mean, Earth...



Source: <http://abyss.uoregon.edu/~js/cosmo/lectures/lec24.html>

13+ Billion years after the Universe began, we arrive in it...



And then we leave it... (or do we?)...

So, while we're here, in this Universe, why not look around and check it out from spaceship Earth...

“Logic will get you from A to Z; imagination will get you everywhere.” - Albert Einstein



Einstein had an incredibly powerful imagination. Astronomy makes you think outside the box, outside of Earth...

Yardsticks (a unit of measure)

Earth



Sun

- Astronomical Unit (A.U. for short) = 92,955,807.27 miles (the distance between the Earth and Sun).
 - The Earth is about 8 light-minutes from the Sun.
 - Jupiter is about 3.9 A.U. from Earth (5.2 A.U. from the Sun).
 - Pluto is, on average, about 38 A.U. from Earth. (How far, then, is it from the Sun?)`
-
- 62,240 A.U. in a light year

The size of a penny to North America is...

- About the same ratio as our solar system (Sun/Planets) to the Milky Way Galaxy.

The Milky Way Galaxy

- 100,000+ light years across.
- 200 billion stars, give or take

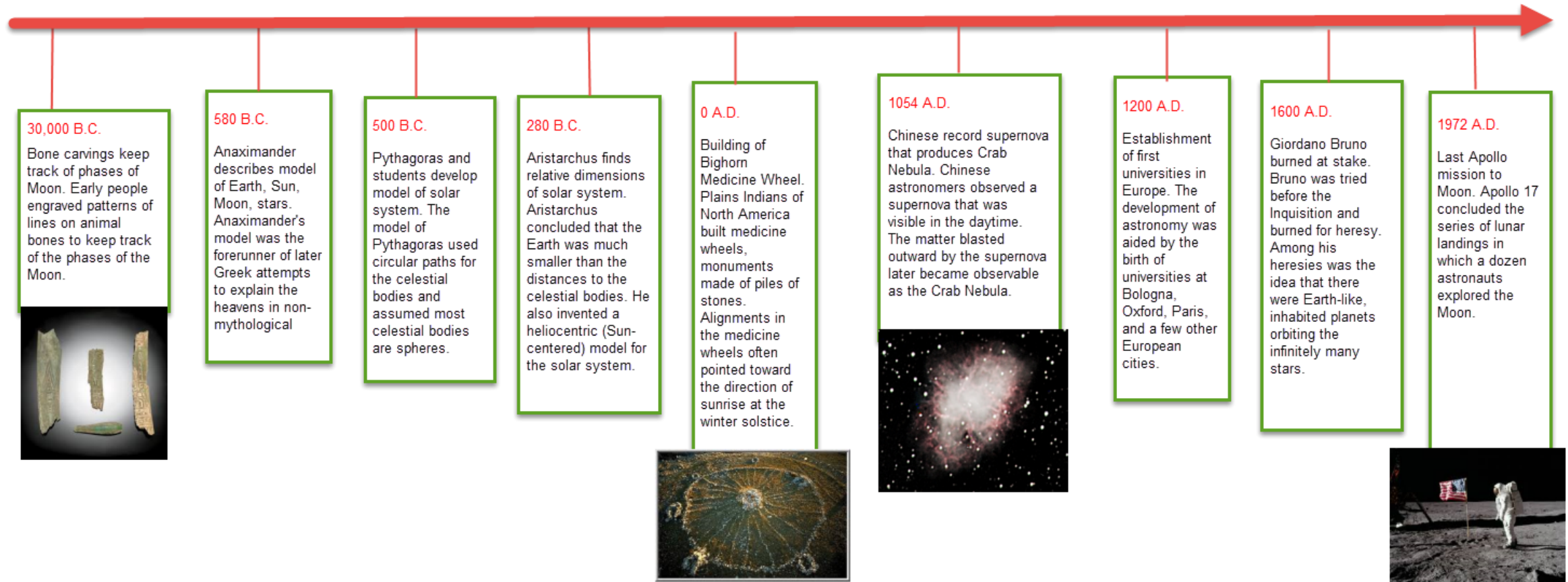


Lion, Regal Beast, Big Constellation

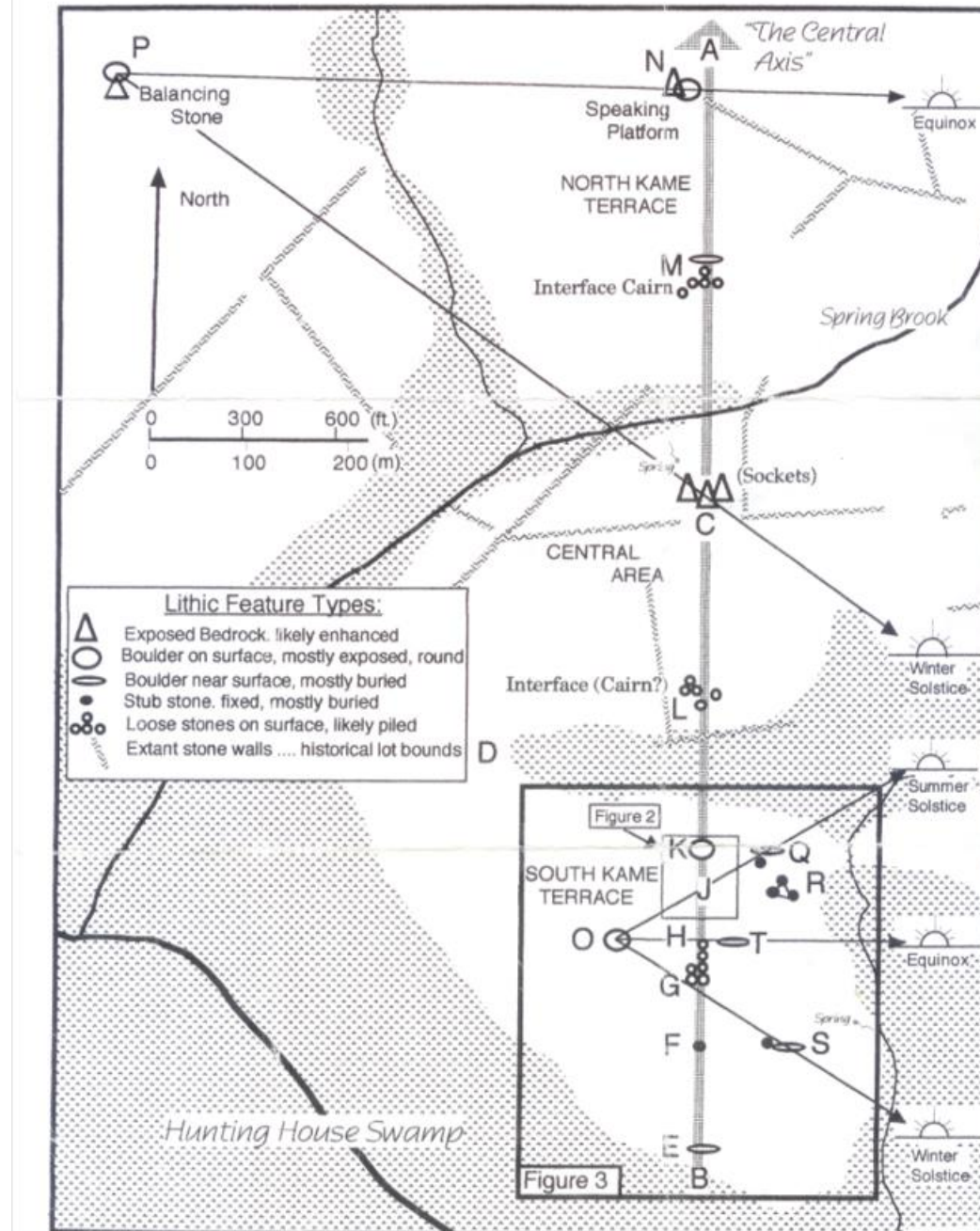


- Ancient cultures didn't have TV's or smart phones – but they had awesome night skies.
- They saw lions, bears, warriors, and gods in the stars. They studied and worshipped the stars.
- A vast amount of knowledge grew out of their fascination with the heavens.
- Have we lost that fascination today? Can we get it back?

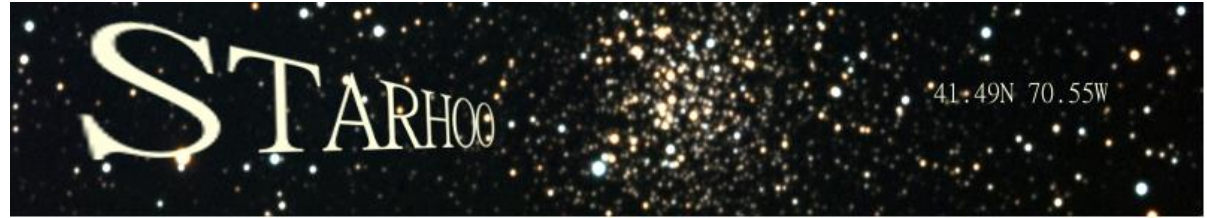
Notable Points on the Astro Timeline



Algonquin Indians Astronomical Calendar, Lakeville, MA



Starhoo Observatory
www.starhoo.com

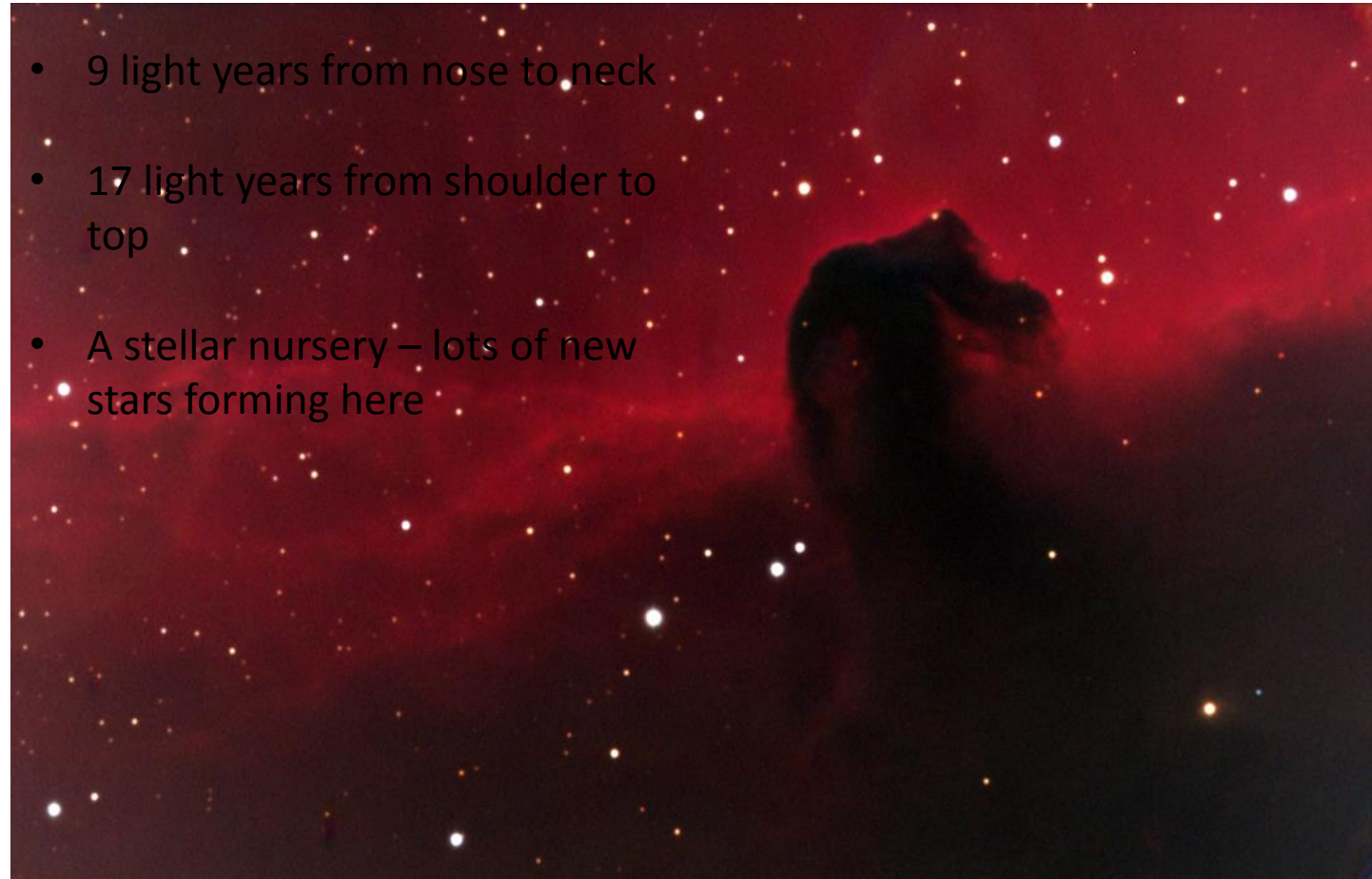
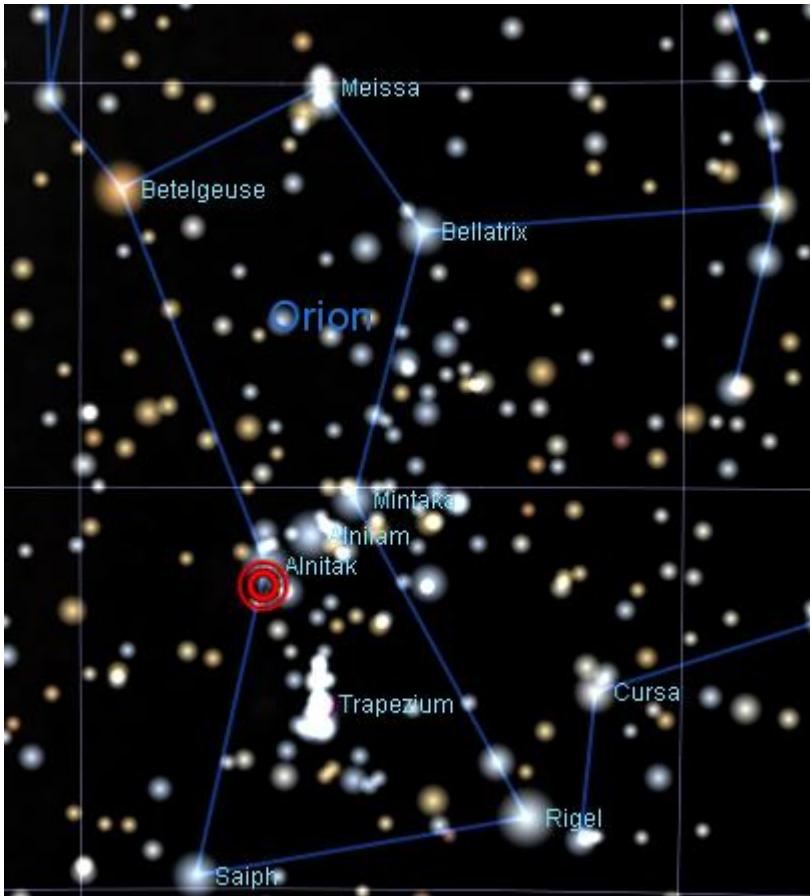




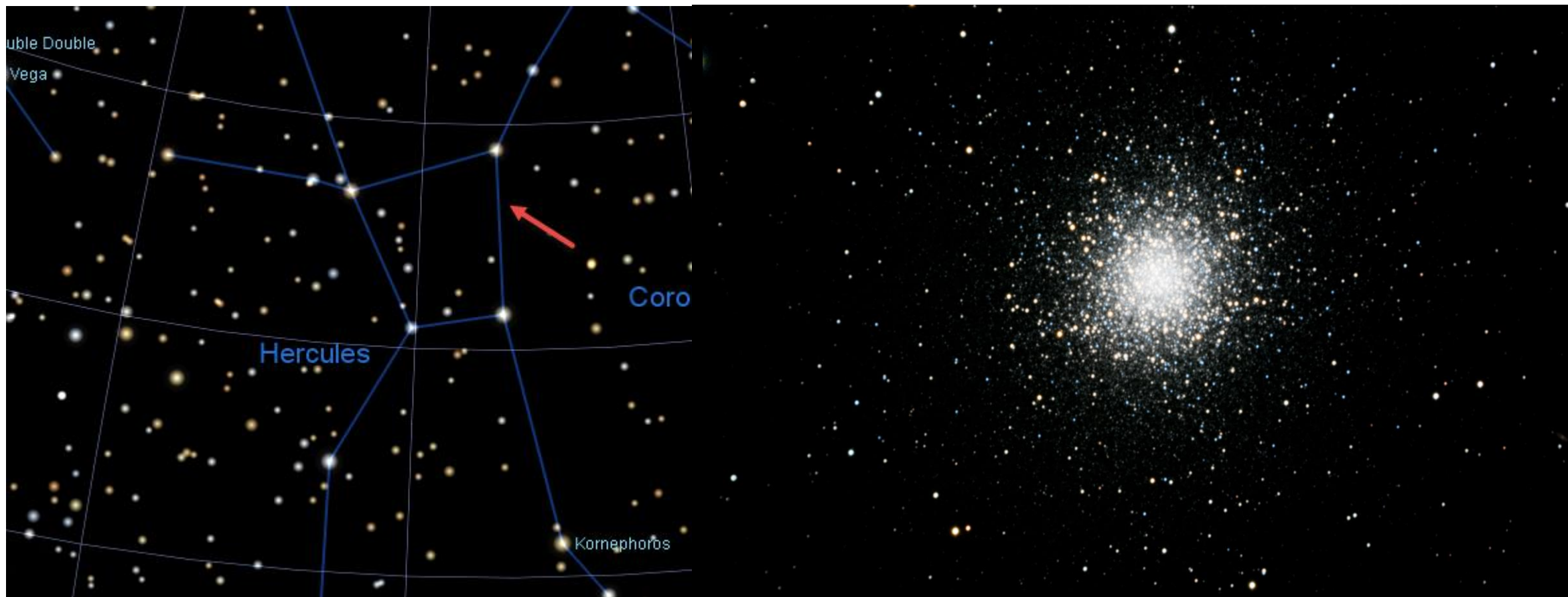




IC 434, The Horsehead Nebula in Orion



M13, Globular Cluster in Hercules

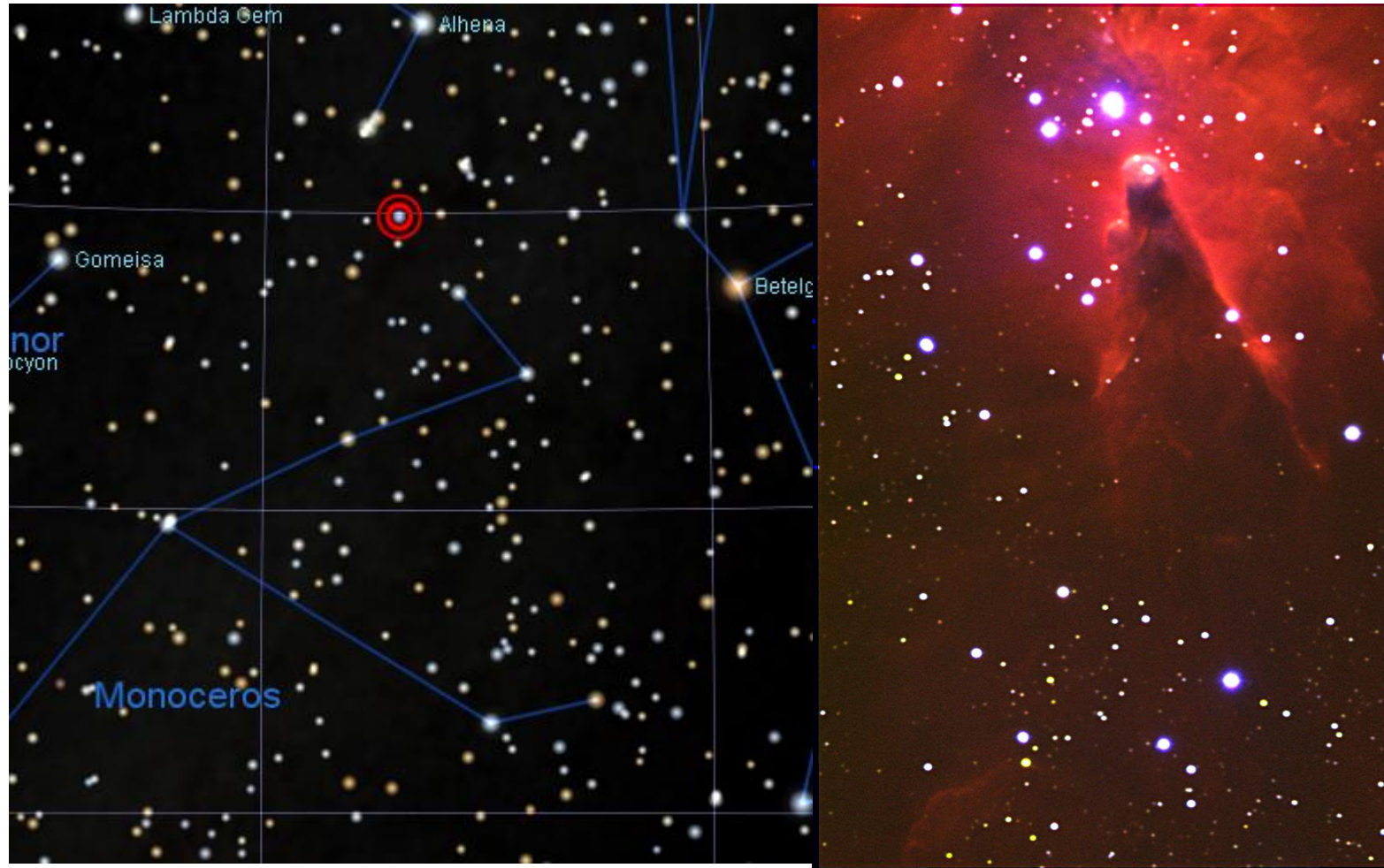


Rosette Nebula in Monoceros (the Unicorn)



5,000 light years away
New stars are forming in its petals
Central cavity is about 50 light years in diameter

NGC 2264, the Christmas Tree Nebula (or Cone) in Monoceros (the Unicorn)



Dumbbell Nebula (M27) in Vulpecula (“little fox”)

- 1,360 light years
- From an exploded star about 14,000 years ago

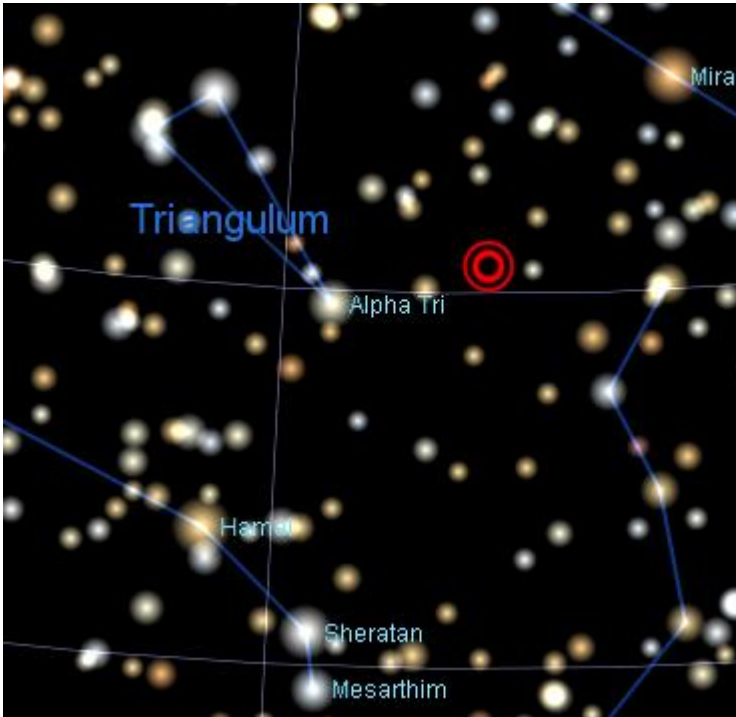


Galaxy NGC 7479 in Pegasus

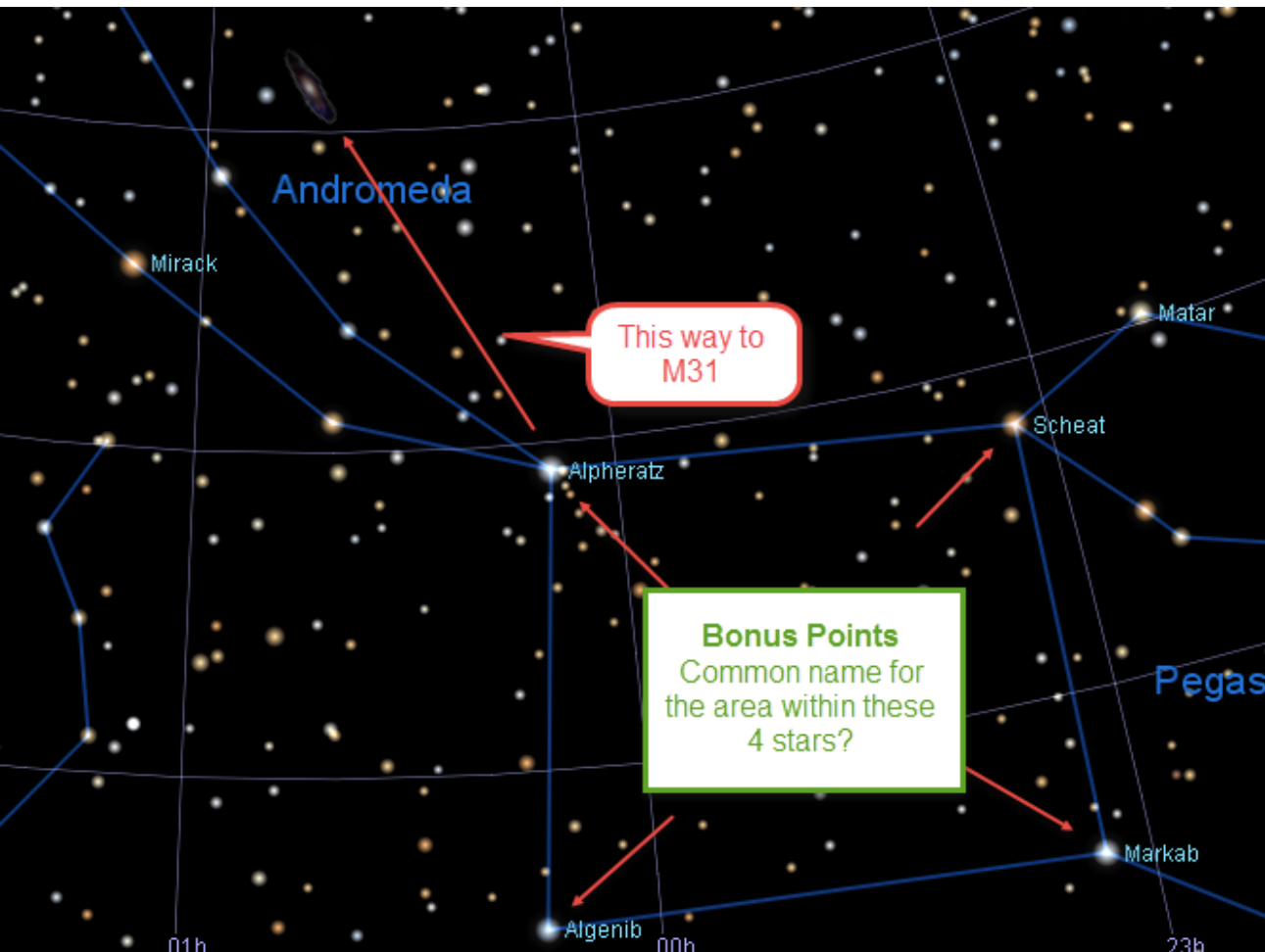
- A “barred” spiral galaxy (note the “bar-like” shape in the center).
- 102 million light years away.



Galaxy M33 in Triangulum (near Big Dipper) About 3 Million Light Years Away



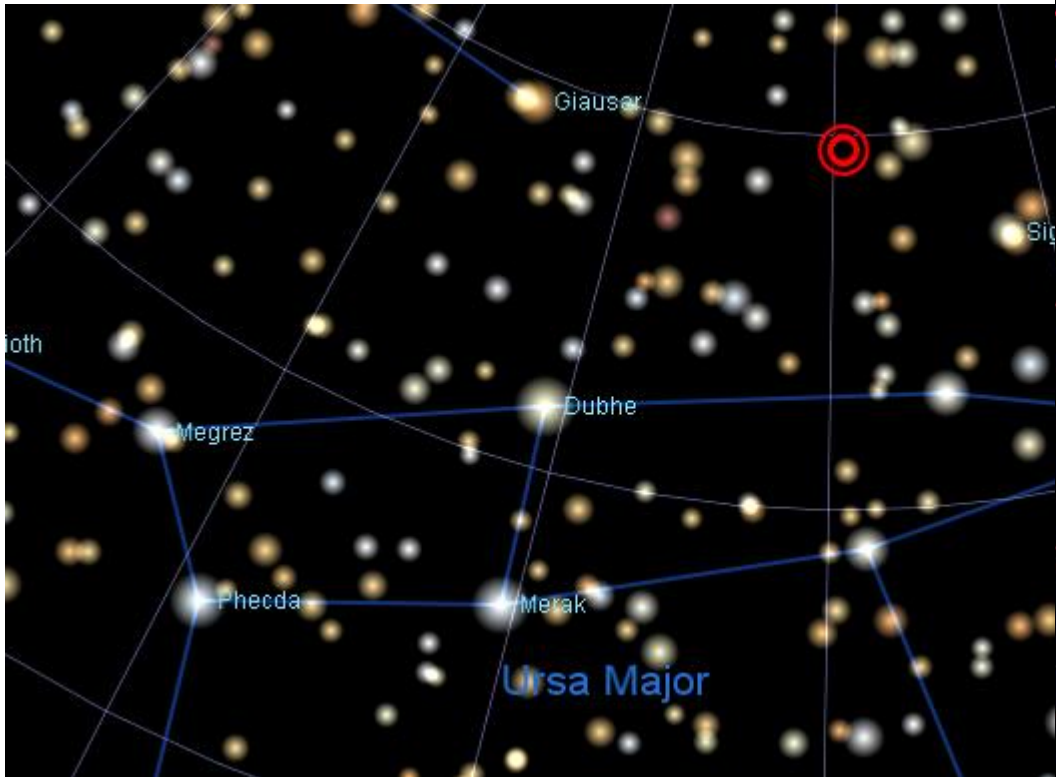
Andromeda Galaxy, M31 – Can be seen with the unaided eye.



The “Blank Blank” of Pegasus,
about 20 degrees corner to
corner...

60 Minute monochrome photo of Andromeda Galaxy M31
12x5 min exposures thru F6 Refractor, taken 10.17.2014.

M81 and M82 in Big Dipper

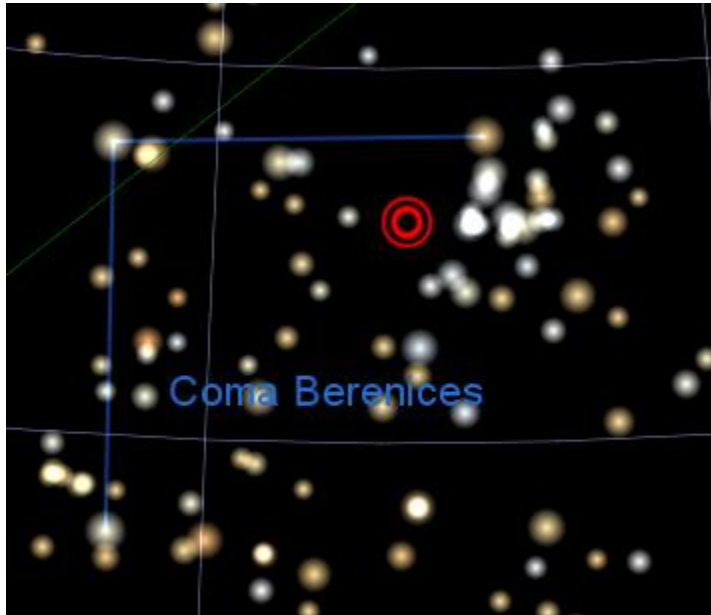


Galaxy NGC 628 (M74) in Pisces

32 Million Light Years Away



Galaxy NGC 4565 in Coma Berenices (Berenice's Hair) (30-50 million light years away)



Moon Shots...

- Thumbnail crescent.
- The dark-lit area is from "earth-shine."



The Moon – Total Eclipse Feb., 2008

- The Moon is in the Earth's umbra (Earth's dark inner shadow).
- The light we see is from the Earth's atmospheric refraction of

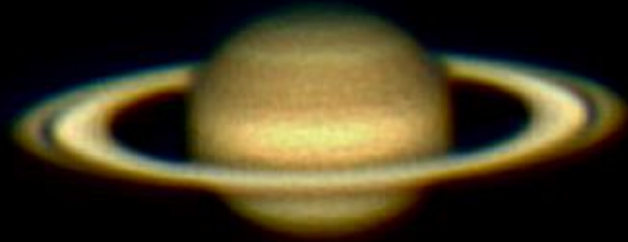


A place I'd like to visit...

- South is up.
- Starting from bottom (North):
 - Ptolemaeus (largest)
 - Alphonsus
 - Arzachel
 - Albategnius(Left/East)
- These craters border *Mare Imbrium*, "Sea of Clouds"



Saturn (2013, left; 2005, right)



Mars, Oct., 2005

- Mars' was especially close to Earth in 2005.
- In 2012 Mars' apparent angular size will be only 14"
- In 2018 it will be approx. 24"



A Homemade 12.5" Reflector



The Mirror
Grounded, Polished, Parabolized,
Coated



Help Wanted

Astronomers, Curious Minds...

Only intelligent life can find other intelligent life.

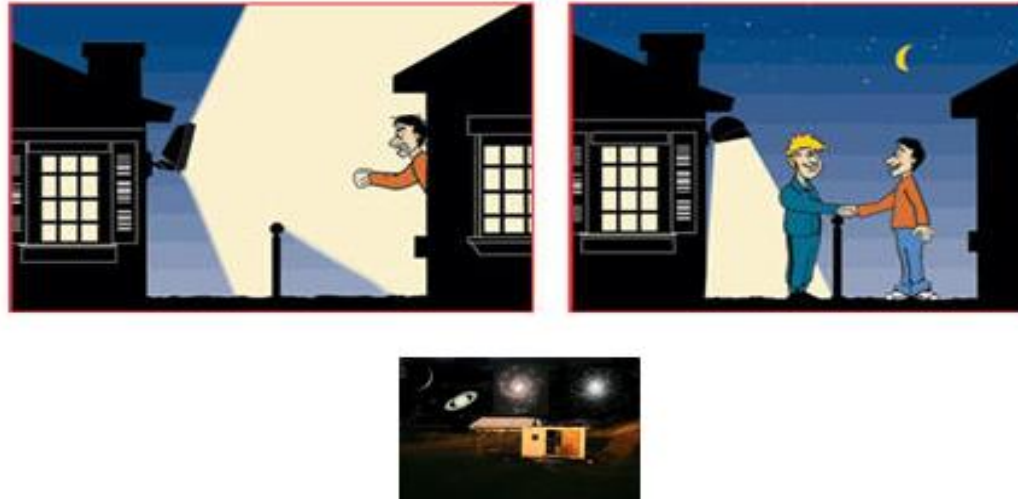
Tasks

- Use planetarium software (The Sky) to operate a research grade telescope.
- Use imaging software (Maxim DL) to capture images of deep space objects, as well as lunar and planetary photos.
- Learn how to synchronize the telescope and mount to the sky for accurate goto and imaging.
- **Caution:** these activities may lead to increased cognitive function and higher SAT scores in all subjects...

David Cole Observatory



Grrrrr... Light Pollution



Glare and Light Trespass

Glare

- Direct view of light source by the eye
- Cause: light fixtures aimed horizontally, not down
- Recognized as issue by professional lighting organizations

Light trespass

- Light spilling off originating property
- Generally not welcomed by neighbor

Effect of glare and light trespass

- Annoyance, vision disturbance
- In severe cases, can be a safety hazard
- Accidental deaths documented
- Poor lighting leads to more poor lighting
- Negatively affects character of community

“May you go among the imperishable stars...”

