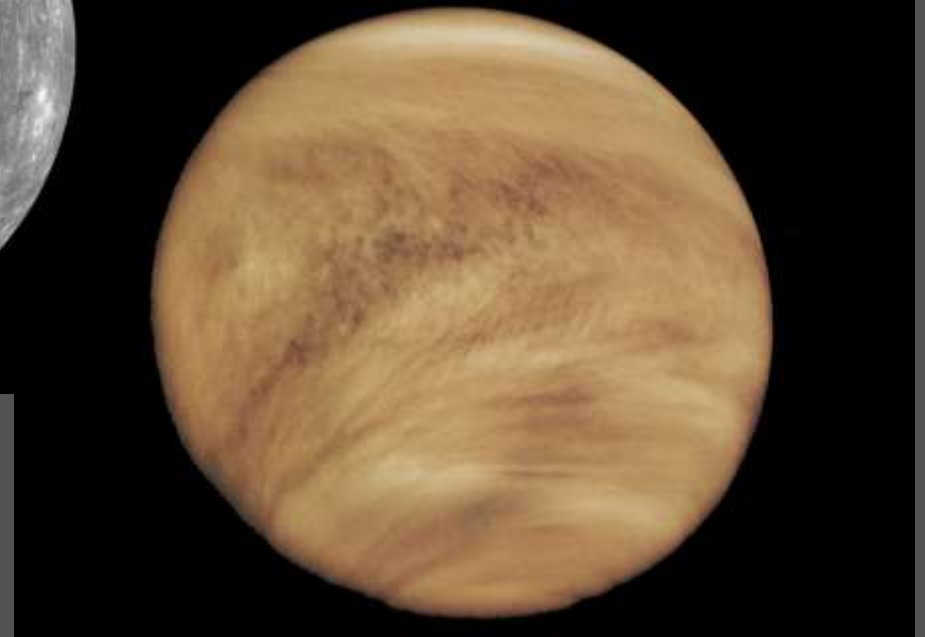
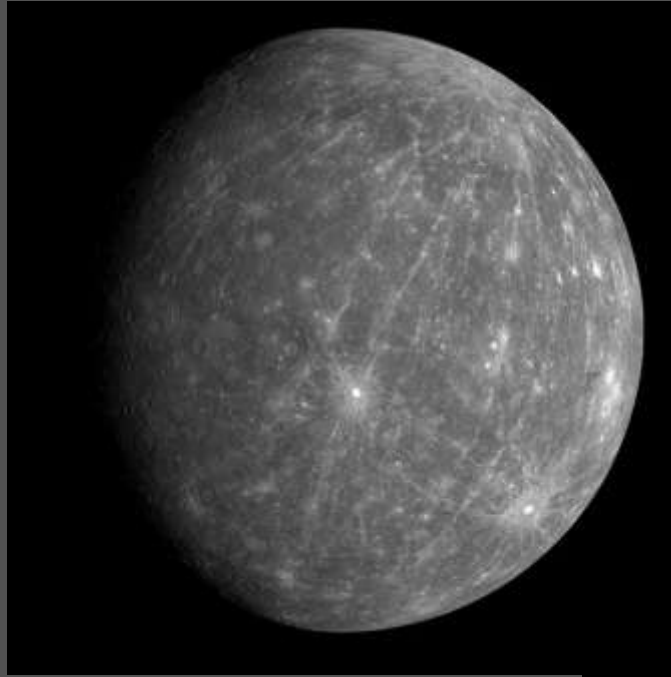


The Inferior Planets



Culpeper Astronomy Club Meeting
October 28, 2019

Overview

- Introductions
- Special Topics
- Mercury and Venus
- Circumpolar Constellations - Video
- Constellations: Aries, Pisces, Cetus
- Observing Session (?)

Photos courtesy of Chris...using 12" Meade LX600 SCT

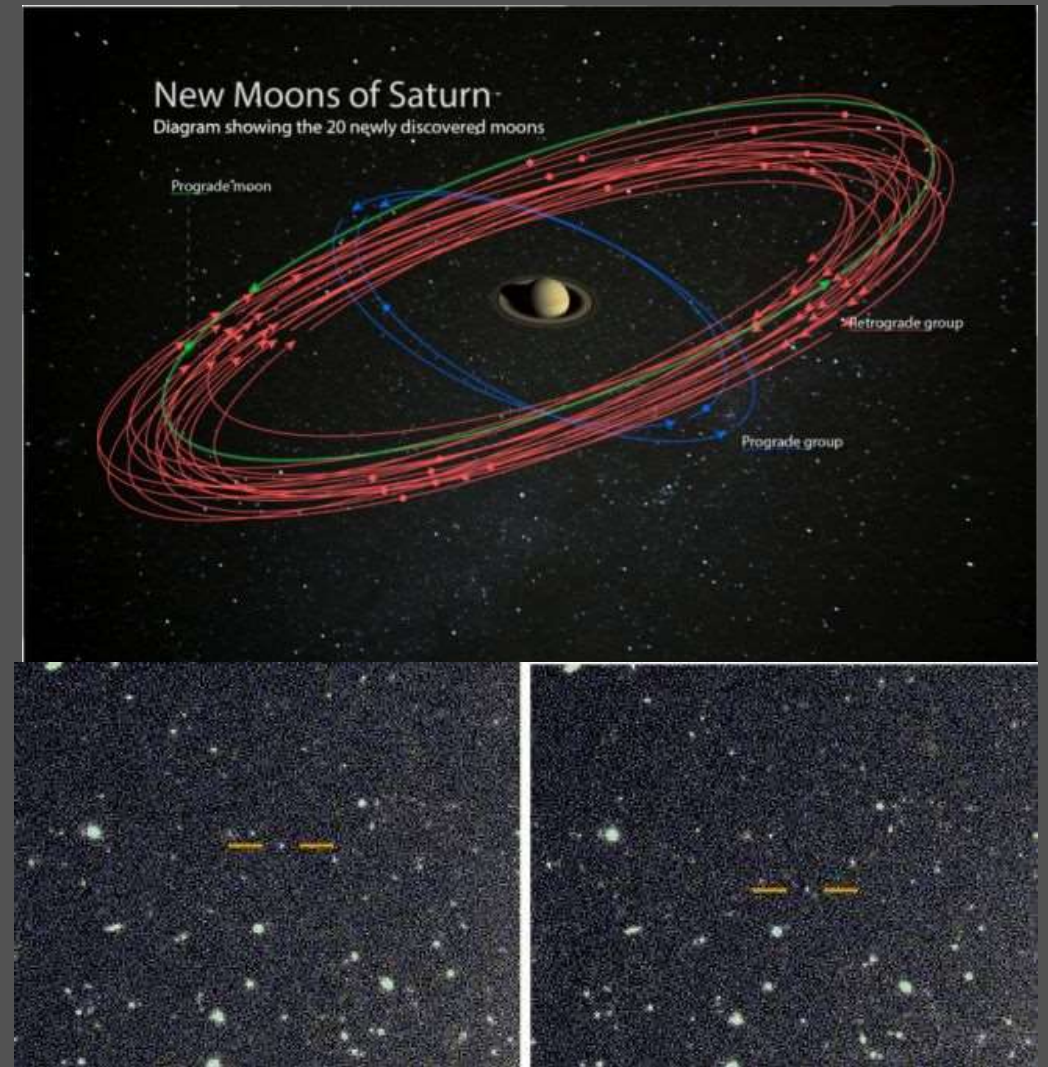


Special Topic: October Planets

- All month – Jupiter and Saturn in the evening sky
- October 16 to December 31 - Mars in the morning sky
- October 10 to December 31 – Venus west in the evening. On November 24, keep an eye out for the conjunction of Venus and Jupiter
- October 20 - Mercury at Greatest Eastern Elongation; reaches 24.6 degrees from the Sun; low in the western sky just after sunset
- October 27 - Uranus at Opposition; blue-green planet will be at its closest approach to Earth and its face will be fully illuminated by the Sun; visible all night
- September 10 to December 31 - Neptune in the evening sky

Special Topic: Saturn New Record Holder

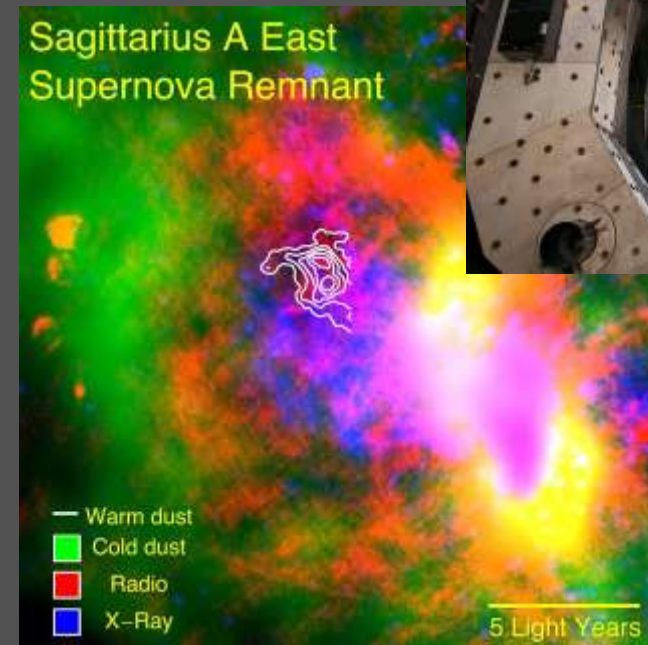
- Astronomers discovered 20 previously unknown Saturn moons, boosting the ringed planet's tally of known satellites to 82 — three more than Jupiter (79)
 - All 20 moons are tiny, measuring about 3 miles (5 kilometers) across
- Seventeen of them have retrograde orbits - move around Saturn in opposite direction to the planet's rotation
- These 17 all take more than three Earth years to complete one Saturn lap, and the most far-flung one is the most distant Saturn satellite known



Special Topic: SOFIA Project

- Based on a Boeing 747SP wide-body aircraft modified to include a large door to allow a 2.5 m (8.2 ft) diameter reflector access to the sky
- Telescope designed for infrared astronomy observations in the stratosphere at altitudes of about 12 kilometres (41,000 ft)
- The primary science objectives of SOFIA:
 - Study the composition of planetary atmospheres and surfaces
 - Investigate the structure, evolution and composition of comets
 - Determine the physics and chemistry of the interstellar medium
 - Explore the formation of stars and other stellar objects

* Stratospheric Observatory for Infrared Astronomy



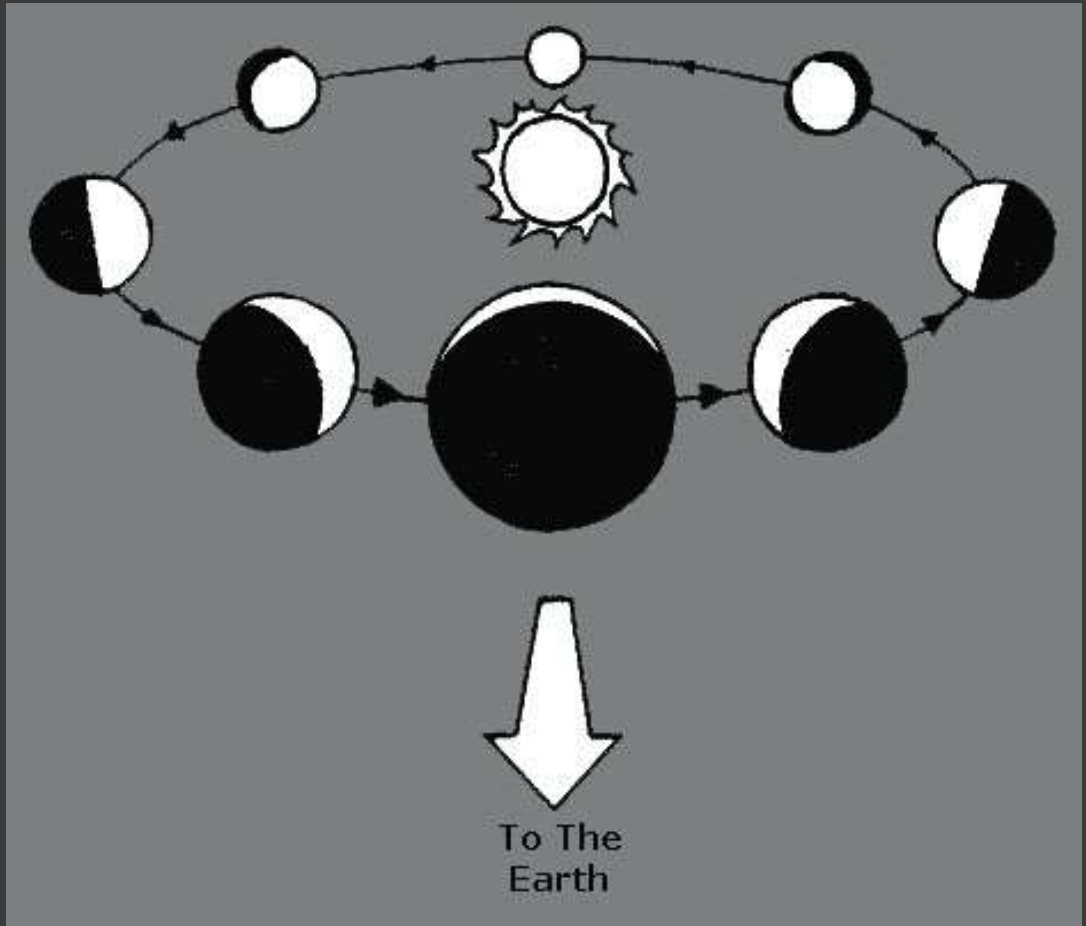
Mercury and Venus

- Two innermost planets from the Sun
- Mercury very difficult to observe because of closeness to Sun
 - Close to sunset or sunrise
 - Displays phases
 - Transits: 11 Nov 2019; 13 Nov 2023
- Venus: brightest “Evening/Morning Star”
 - Covered in highly reflective clouds
 - Presents distinct phases
 - Best viewing during “half” or “crescent” phase
 - Next Transit: Dec 2117



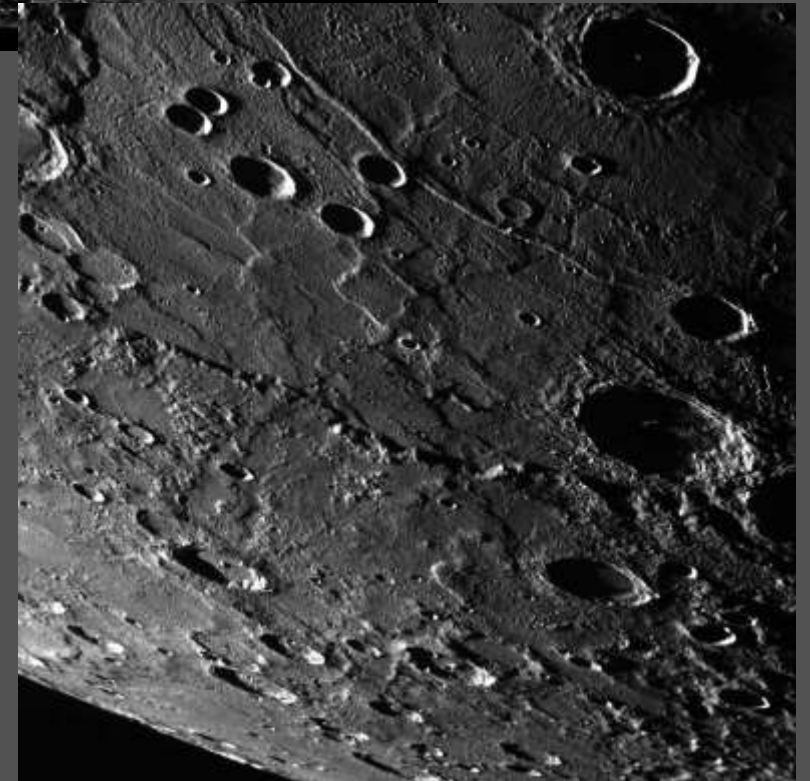
Inferior Planets - Phasing

- Mercury and Venus show phases like those of the Moon
- As they pass behind the Sun – at superior conjunction – we see those parts of their surfaces which are also directed towards the Sun and are illuminated
- When they pass between the Earth and the Sun – at inferior conjunction – we see those parts of their surfaces which are directed away from the Sun and are not illuminated

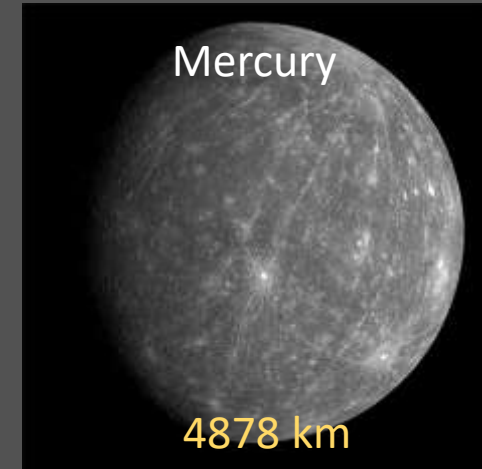


Mercury

- Mercury was named for the swift Roman "messenger" god
 - Orbits Sun faster than any other planet
 - Revolution - 88 days; Rotation – 59 days
- Smallest planet in our solar system
 - Only slightly larger than our moon
 - Ganymede and Titan are larger
- Mercury's surface resembles that of Earth's Moon
 - Scarred by many impact craters resulting from collisions with meteoroids and comets
 - Has very little atmosphere to stop impacts: is covered with craters
 - Mercury is the second densest planet after Earth, with a large metallic core

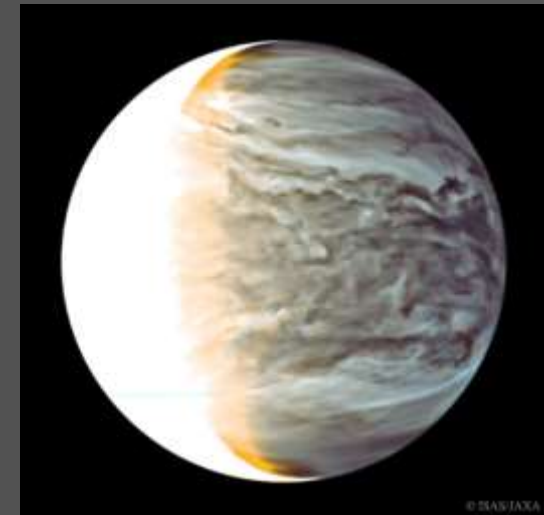


Largest Moons of the Solar System



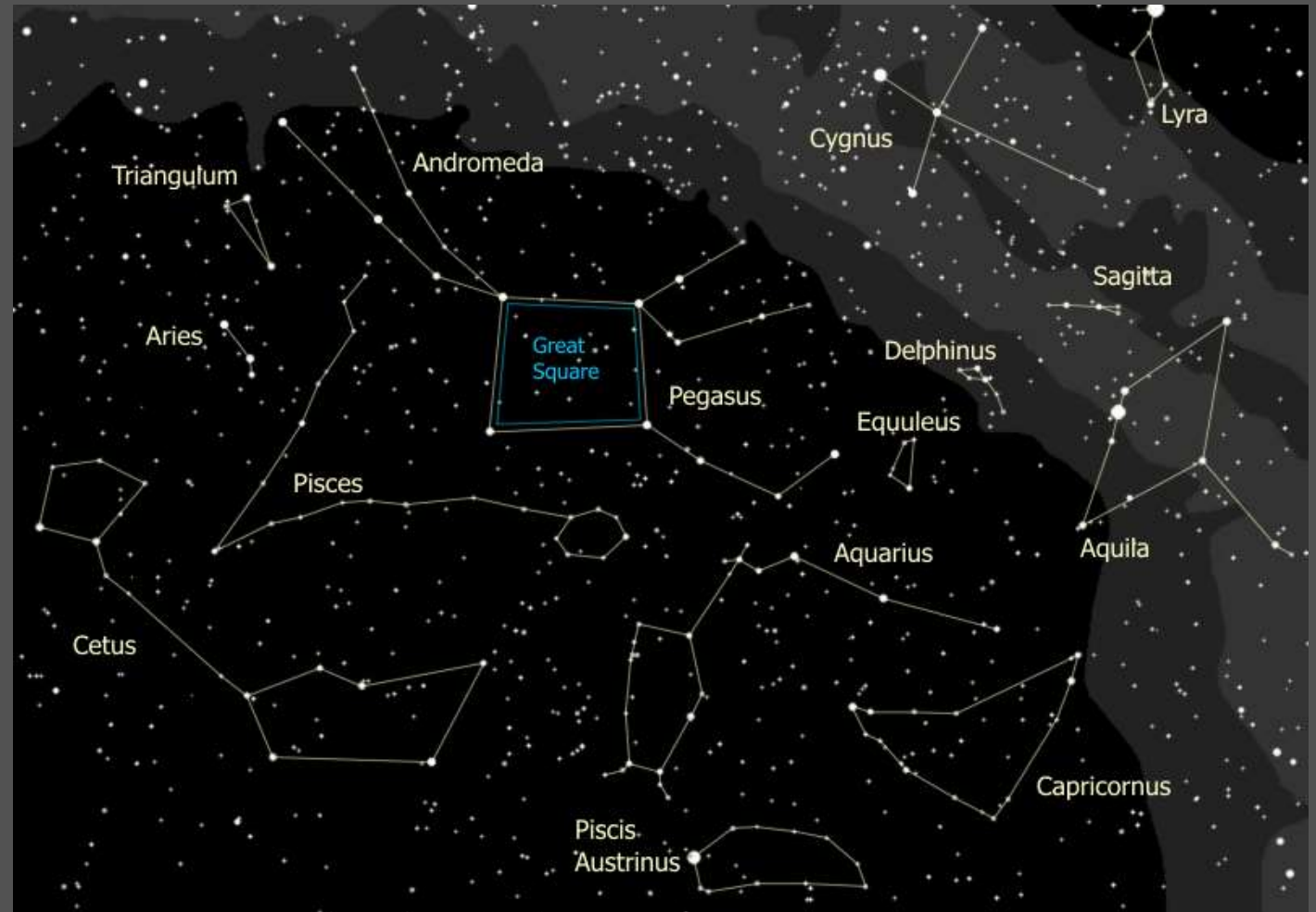
Venus

- Venus is named for the ancient Roman goddess of love and beauty
 - Counterpart to the Greek goddess Aphrodite
- Similar in structure and size to Earth, Venus spins slowly in the opposite direction most planets do
 - It completes one rotation in 243 Earth days — the longest day of any planet in our solar system
 - Its orbit around the sun is the most circular of any planet — nearly a perfect circle
- Thick atmosphere traps heat in a greenhouse effect
 - The hottest planet in our solar system with surface temperatures hot enough to melt lead



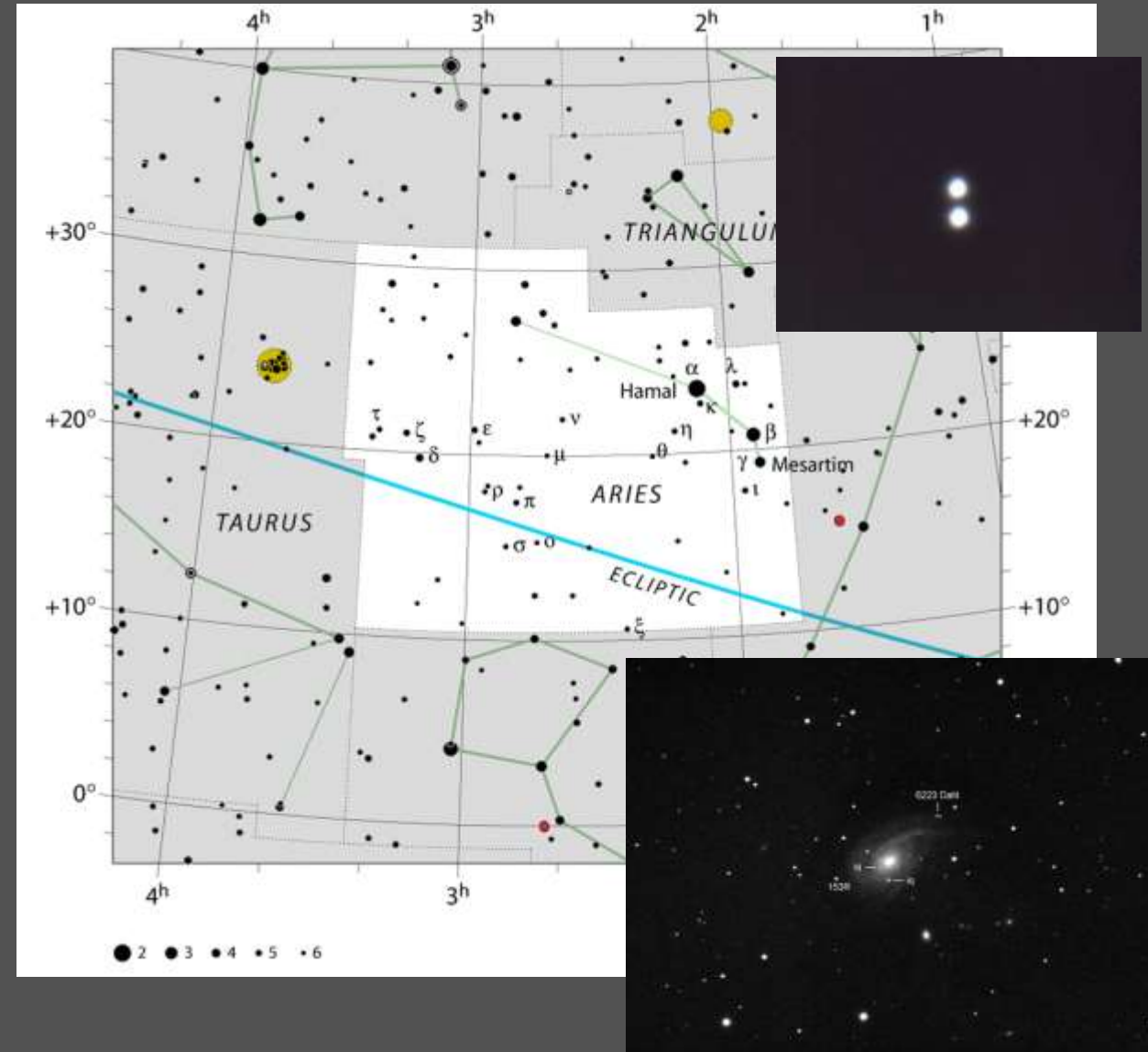
Constellations

- Constellations:
 - Aries – “The Ram”
 - Pisces – “The Fish”
 - Cetus – “The Whale”



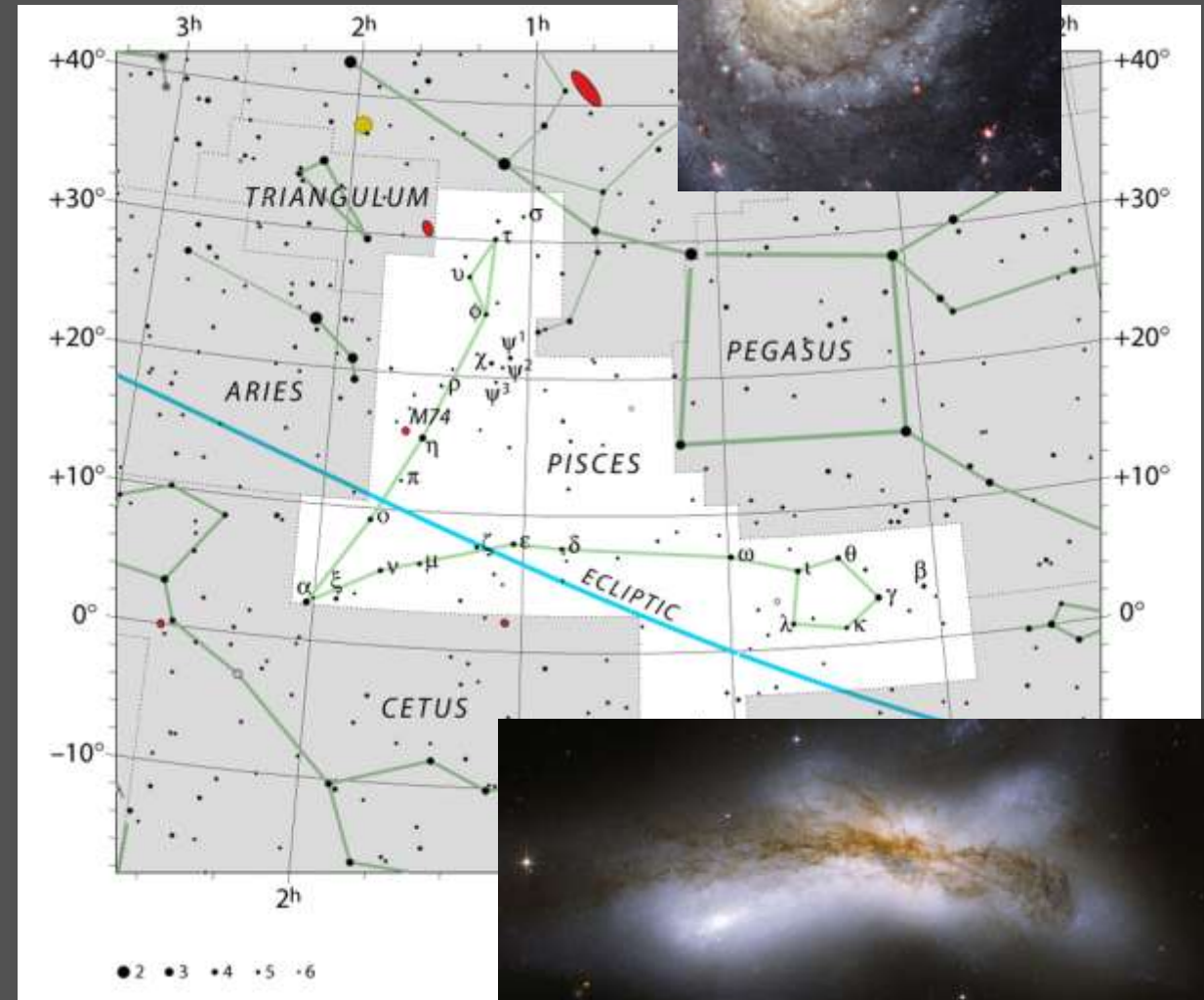
Aries – “The Ram”

- Identified with the golden ram that rescued Phrixus who sacrificed the ram to the gods
 - The Ram’s skin that he placed in a temple was the Golden Fleece, which later appears in the story of Jason and the Argonauts
- Mesarthim, Gamma Arietis: triple star that includes a binary system white stars (4.75 and 4.83 mag); 7.7 arcsec apart (The Rams Eyes), and a third 221 arc sec sep
- NGC 772 - spiral galaxy about 130 LY distant; 11.3 mag; southeast of Beta Arietis
- Other galaxies: NGC’s 1156, 972, 697



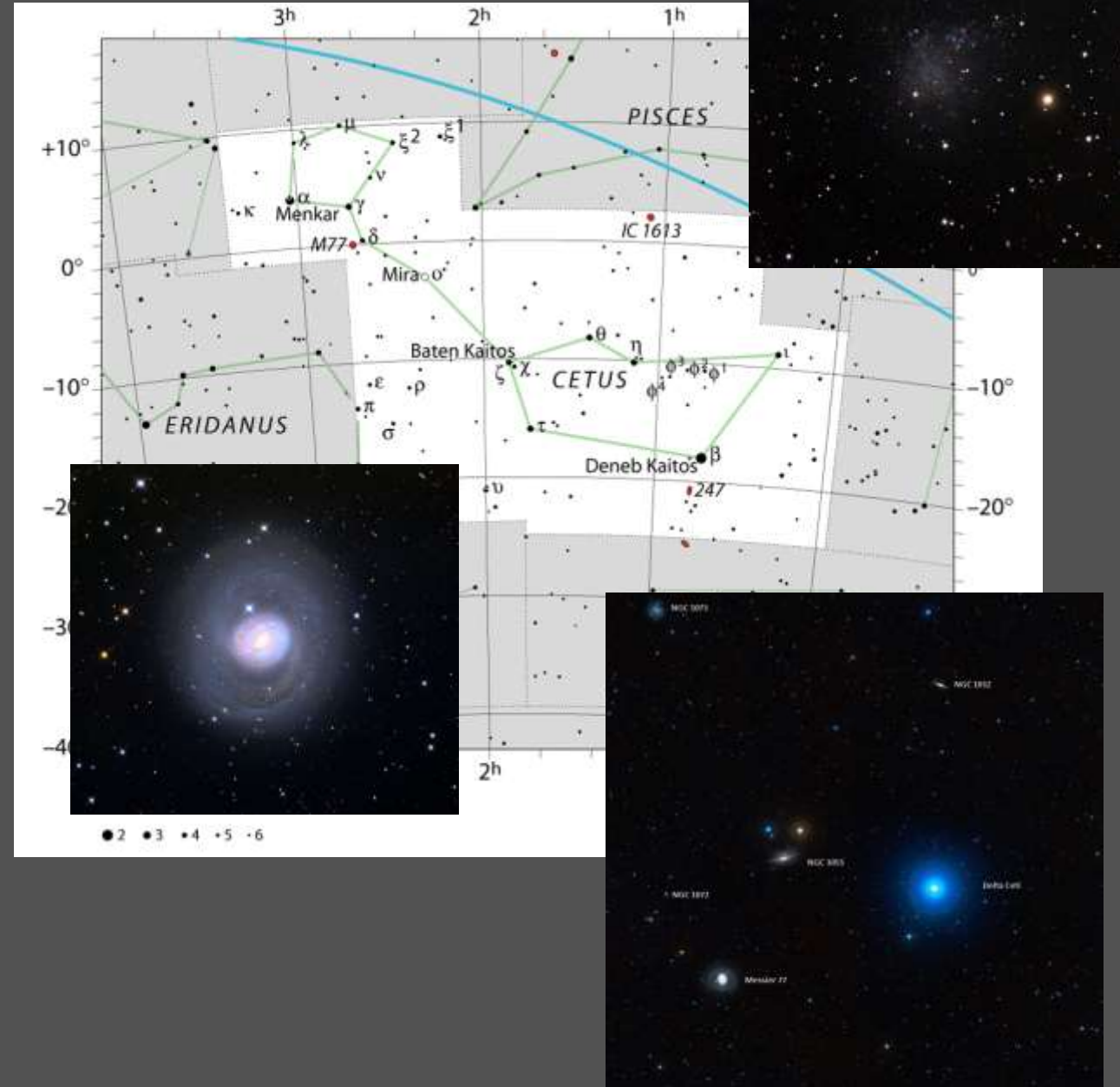
Pisces – “The Fish”

- The Babylonians saw it as a pair of fish joined by a cord. The constellation is usually associated with the Roman myth of Venus and Cupid
- Double Stars:
 - Alpha Piscium - components separated by 1.8 arc sec; primary star (4.33 mag) and the companion (5.23 mag); period of 700 years
- Deep Sky Objects:
 - M74 - spiral galaxy seen face-on; 10 mag; 30M LY distant; textbook example of a grand design spiral galaxy; contains about 100B stars
 - NGC 520 - pair of interacting spiral galaxies about 90.7M LY distant; 12.2 Mag



Cetus – “The Whale”

- The constellation was named after Cetus, the sea monster from the Greek myth about Andromeda. In the myth, the princess was sacrificed to the monster as punishment for her mother Cassiopeia’s boastfulness
- Omicron Ceti (Mira): binary star; 420 LY distant; variable star that is example for class of variables
- Messier 77: spiral galaxy; 47M LY distant; 170K LY in diameter; 9.6 mag; one of the largest galaxies listed in Messier’s catalog
- IC 1613: dwarf galaxy; in local group; approaching Earth at 234 km/s; played role in calibration of Cepheid variable period-luminosity relation for estimating distances
- Spiral galaxies: NGC’s 1055, 1087, 1073, 45, 17 (15 mag)



Meteor Showers

- Some of the best are listed below along with dates when the most meteors are visible
 - Quadrantids, January 3-4 (Comet 2003 EH1)
 - Lyrids, April 22-23 (Comet Thatcher)
 - Perseids, August 12-13 (Comet Swift-Tuttle)
 - Orionids, October 20-21 (Halley's Comet)
 - Leonids, November 17-18 (Comet Tempel-Tuttle)
 - Geminids, December 13-14 (Asteroid 3200 Phaethon)
 - Ursids, December 23-24 (Comet 8P/Tuttle)
- The name of each shower refers to the constellation to which the meteors trace their apparent paths



Upcoming Events

- Next Meeting: November 25
 - Primary Topic: The Winter Constellations
 - Last meeting for 2017!
- Leonid Meteor Shower – November 17/18 (New Moon)
- Geminid Meteor Shower – December 13/14