Stars Over Surrey

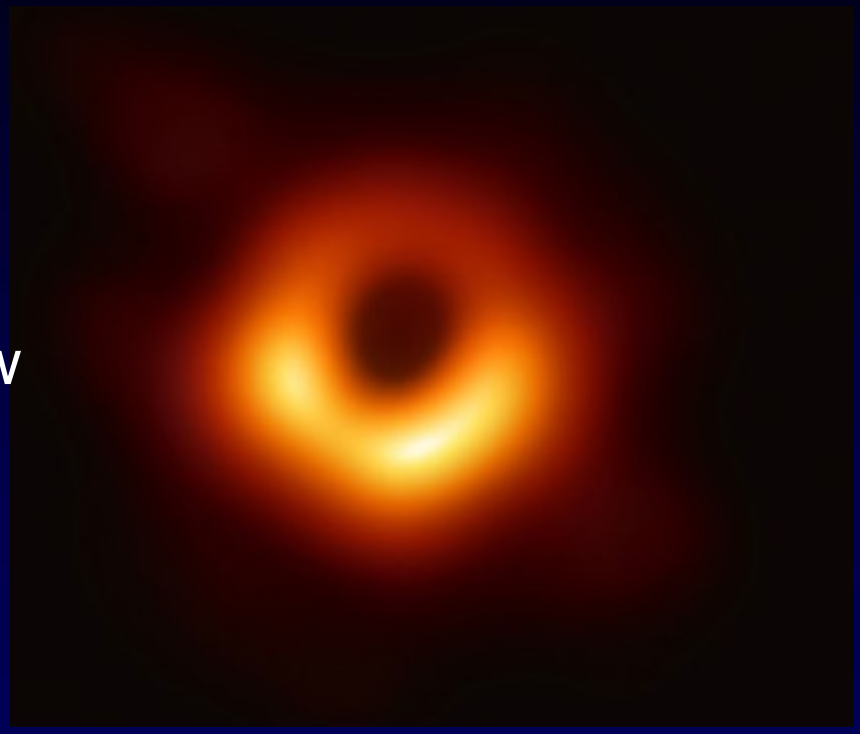
Astronomy & Spaceflight News

26th April 2019

BROOKLANDS RADIO ONLINE The Sound of Surrey

First Image of a Black Hole

- The Supermassive Black Hole is in M87, 55 M LY away
  - 6.5 Billion solar masses
- First ever direct image of a black hole, or rather, its shadow
  - international team using 8 radio telescopes around the world
  - Event Horizon Telescope
  - advanced algorithm to assemble data into one visible image



- Light ring shows photons accelerated to near light speed as they approach the event horizon (bounday of the black hole)
  - shadow is about 3 times size of our solar system and 2½ actual size
  - gravity bends the light around black hole
- Result completely consistent with General Relativety

Space X Crew Dragon "Anomaly"

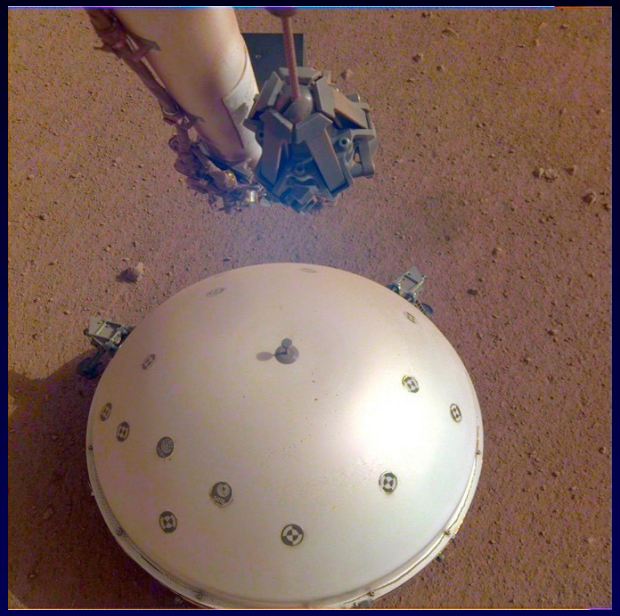
- A test firing of the Crew Dragon's SuperDraco thrusters resulted in a large explosion on 20th April
  - These are only used for the emergency abort system
  - 8 engines grouped in 4 pairs
  - Crew Dragon uses ordinary Draco thrusters for orbital manoevering.
  - This was believed to be the same capsule that visited ISS
    - could salt water have caused some damage?
  - The capsule is believed to have been destroyed
  - Innovations: 3D-printed rocket chambers and liquid (hypergolic) fuel
- The full test of the abort system was due in June and is an essential precursor to Demo-2 (manned flight to ISS), expected no earlier than late July
  - this is now thought to slip to October or even later

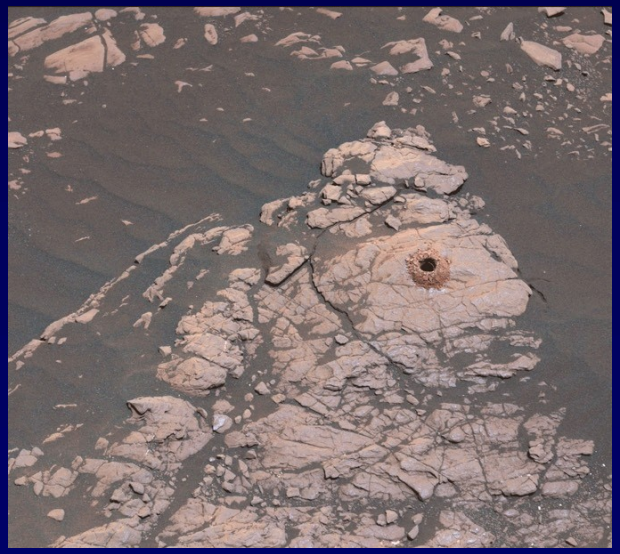
Space X: Success for Falcon Heavy

- 2nd launch of Falcon Heavy, 1st commercial mission
  - 11th April
  - Pad 39A, Cape Canaveral
  - 27 Merlin engines, totalling five million lbs of thrust
- 2½ mins after launch the two side boosters and central core separated and head back, leaving 2nd stage with ArabSat 6A
  - two side boosters landed at Space X's recovery facility at Cape Canaveral AF Station, a few miles south of pad 39A
  - central core landed on drone ship, 1000 miles off coast
    - landed OK but rough seas caused it to topple over before speedboat crews could get there to make it secure

NASA's Mars Mission Miscellania

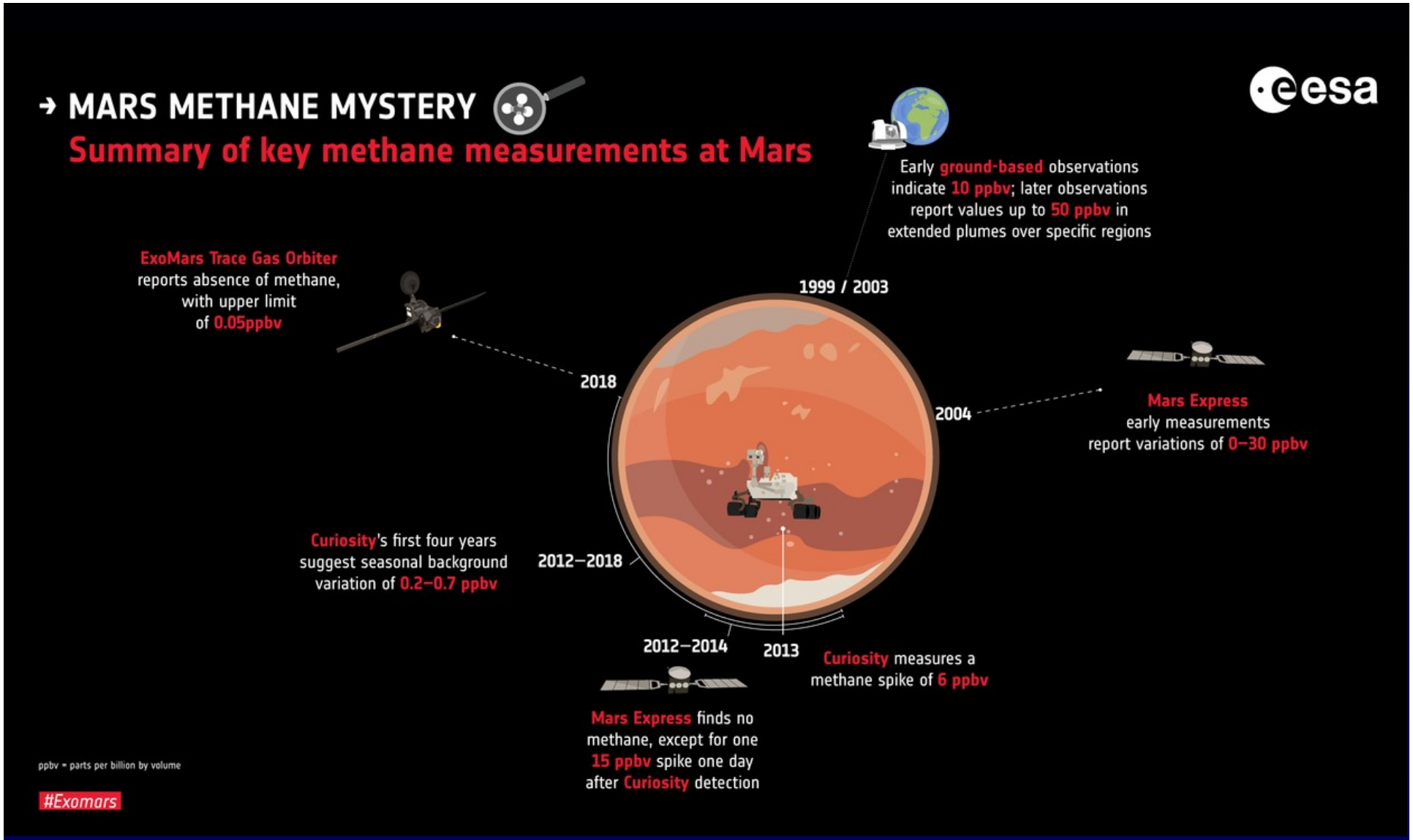
- InSight Lander
  - Seismometer detects first Marsquake
    - French built instrument, but sensor developed at Imperial College
  - Definitly from interior and not from some surface phenomenon
  - important first proof that Mars is seismically active
    - not plate tectonics as on Earth
    - like Moon this will be by subsurface heating & cooling
  - Mole still out of action pending tests
- Curiosity Rover
  - has succesfully drilled into clay bearing strata on foothills of Mount Sharp.





Mars's Methane Mystery

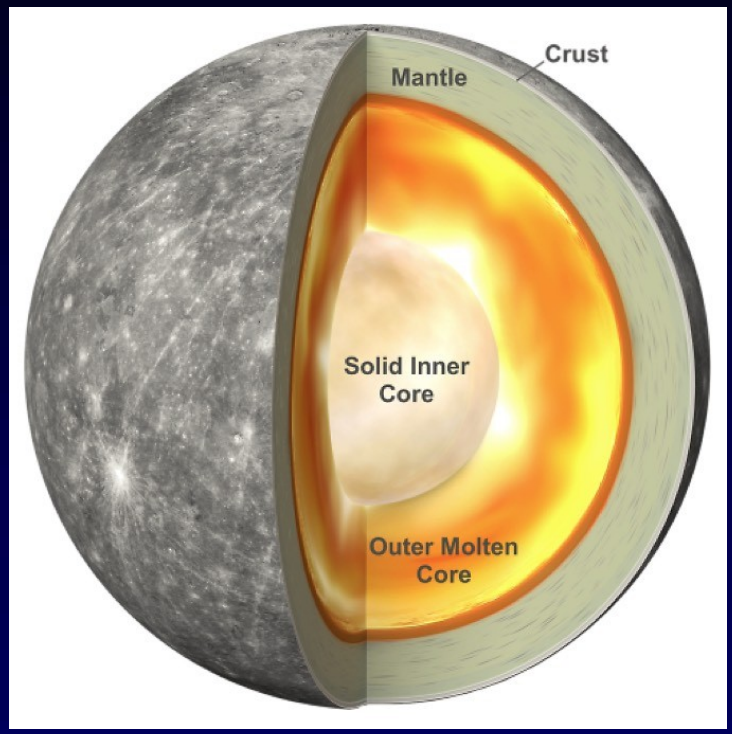
- Trace Gas Orbiter is a joint
- ESA-Roscosmos Mission Curreny gradually moving into its final orbital height using aerobraking in Mars's very thin upper atmosphere
- So far it has detected far less methane than expected
- NASA's Curiosity and ESA's Mars Express had separately detected the same temporary spike in methane levels
  - where's it gone? was it really there?
- Methane is either produced volcanically or biology
  - it could have been produced millions of years ago but trapped in undergound reservoirs, seeping or jolted by meteor impacts
  - on Earth 95% of atmospheric methane is of biological origin



ppbv = parts per billion by volume

Mercury's 'Heart-of-Iron'

- Messenger, a NASA probe orbited Mercury 2011 to 2015
  - Its position was carefully monitored during its last very low level orbits before it was deliberately crashed.
  - Detailed analysis of that data plus radar studies from Earth has revealed the inner structure
- Mercury has a huge solid iron inner core, surrounded by an outer molten core
  - its inner core is about the same size (2,000 K) as that of Earth
  - the interaction of inner and outer cores generates Mercury's magnetic field
  - the inner & outer cores account fof 85% of Mercury's volume
    - huge in comparison with the other rocky planets



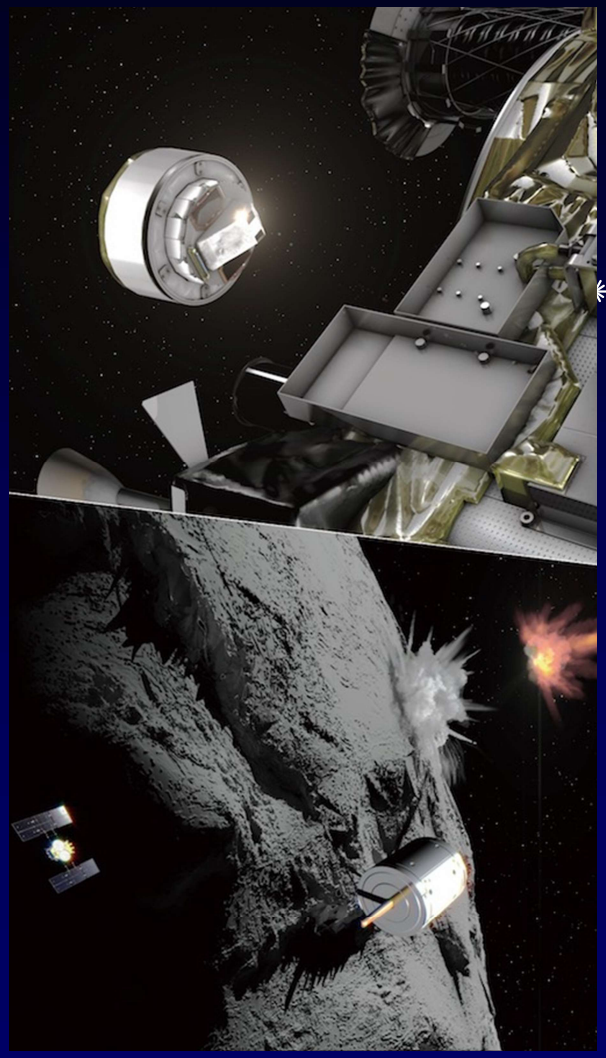
Another Asteroid Explodes Over Russia

- Another small asteroid has exploded over Russia
  - Krasnoyarsk in Siberia
- Entered Earth's atmosphere at about 40,000 mph
  - 11 miles/second
  - estimated as between 1 to 2 metres across

- 3rd bright fireball over Russia in last few months
- Why Russia?
  - 70% of Earth's surface is water, so most large fireballs go unreported
  - At 6.6 million square miles Russia is largest country on Earth
- No meteoric fragments found as yet

Hyabusa 2 “bombs” Asteroid Ryugu

- JAXA's Hyabusa 2 sets off explosive charge to create new crater on Asteroid Ryugu
- Small Carry-on Impactor
  - 21 lb plastic explosive in shaped charge sends copper plate hurtling into asteroid at 4,500 mph
- Small crater 30' across expected
- Hyabusa retreats to safety at far side of Ryugu
- Camera left separate from Hyabusa confirms explosion took place.



Isreali Moon Lander Glitch

- Beresheet nearly made it!
  - on its final approach telemetry was briefly lost, when regained it showed it was descending too rapidly, so a “reset” command was sent. This seemingly set off an error somewhere in software from which it was too late to recover
  - NB Nothing wrong with British-built LEROS engine

- A success in many ways
  - first commercial (private funding) mission to Moon
  - first to use the repeatedly lengthened orbital elipse trajectory
  - Israel became seventh country to orbit Moon
  - Israel became fourth country to reach Moon

SOFIA Identifies Primordial Molecule

- NASA has an airborne observatory in converted 747
  - SOFIA (Stratospheric Observatory For Infrared Astronomy)
  - operates around 45,000' well above water vapour in the hottest & thickest part of atmosphere.
- After the Big Bang there would have been just two elements existing, Hydrogen & Helium
- Scientists believe that the first molecule to have been formed was Helium Hydride (HeH^+) from an atom of each
  - around 100,000 years after Big Bang.
  - This has never before been detected until now.
- Its discovery by SOFIA has confirmed a key part of our understanding of the chemistry of the early universe.

May's Suggested Constellation - but which one?

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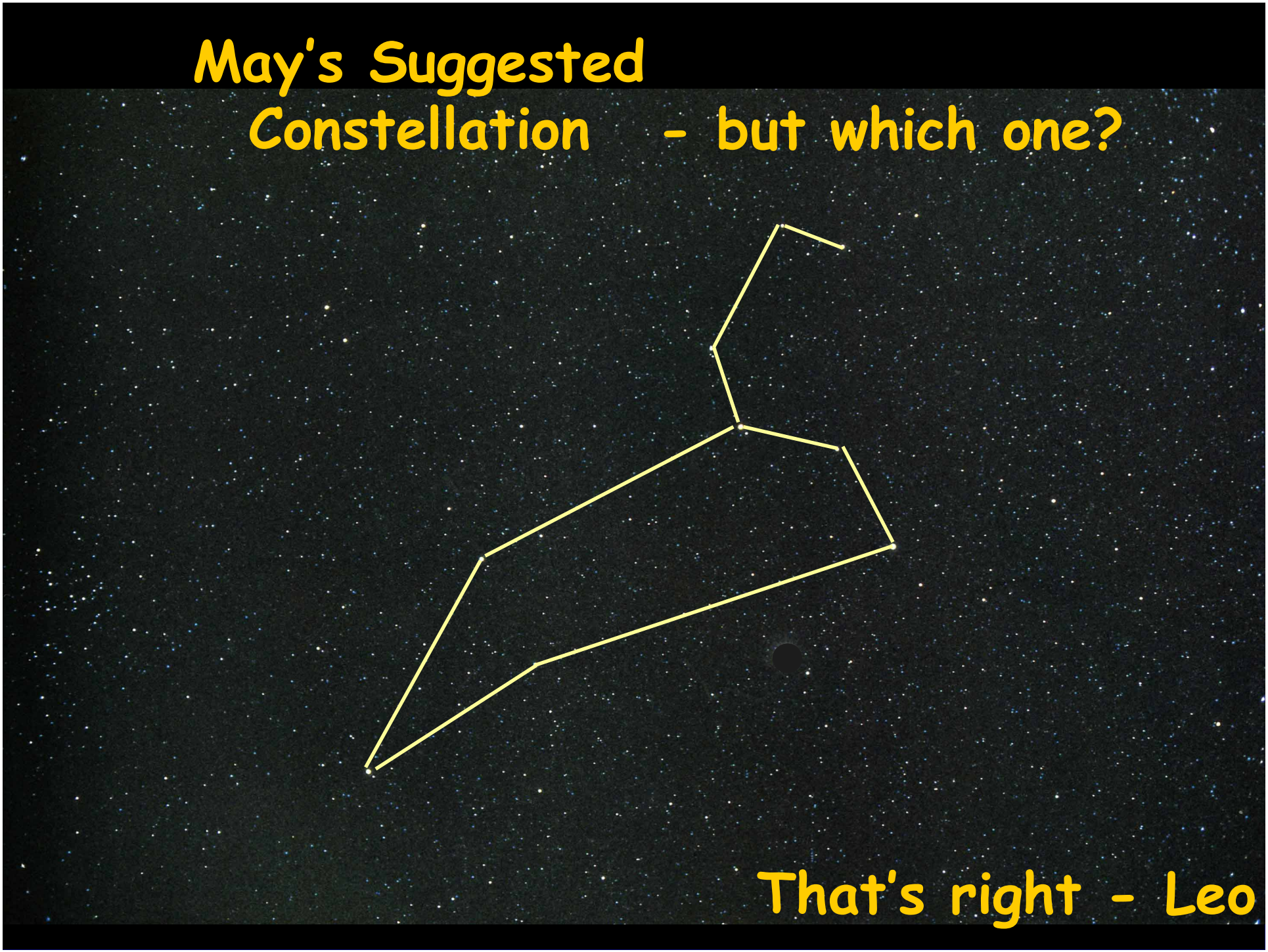
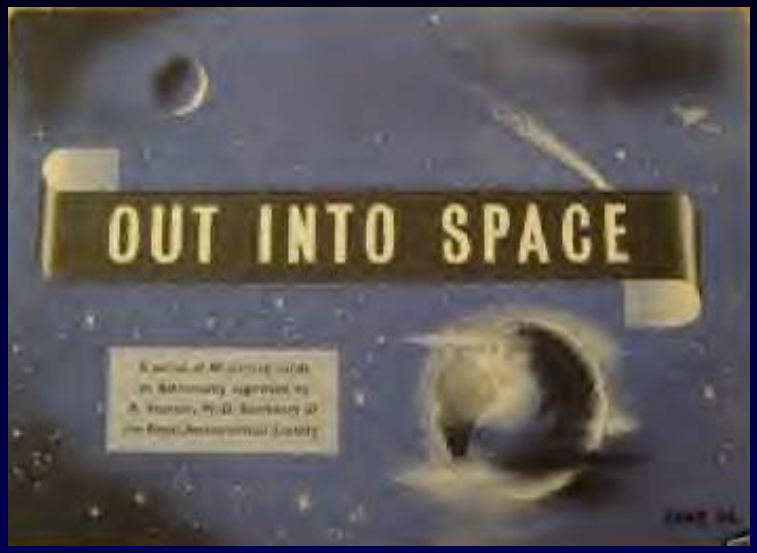
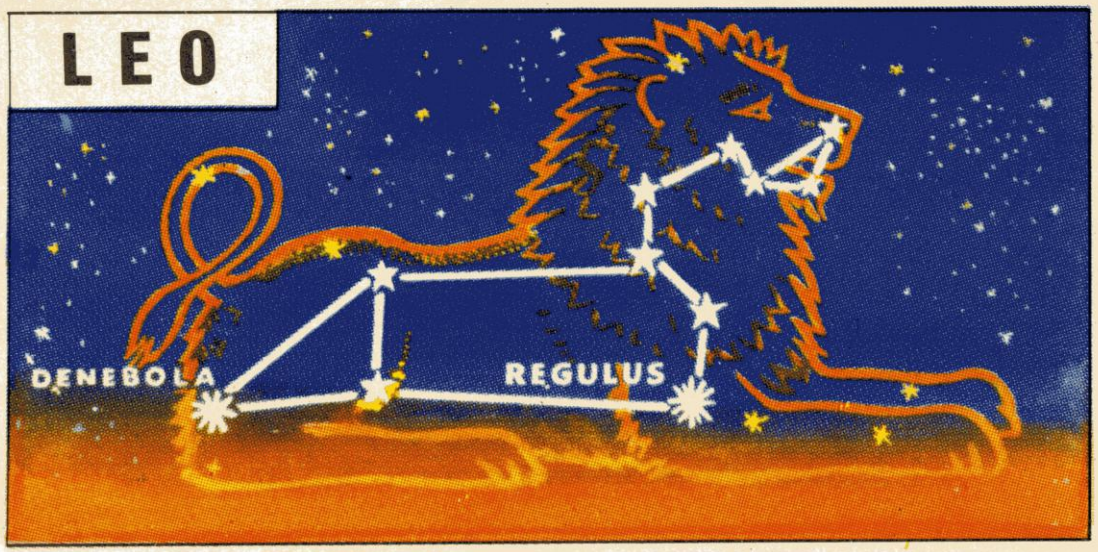


That's right - Leo

May's Suggested Constellation





A SERIES OF 50 No. 28

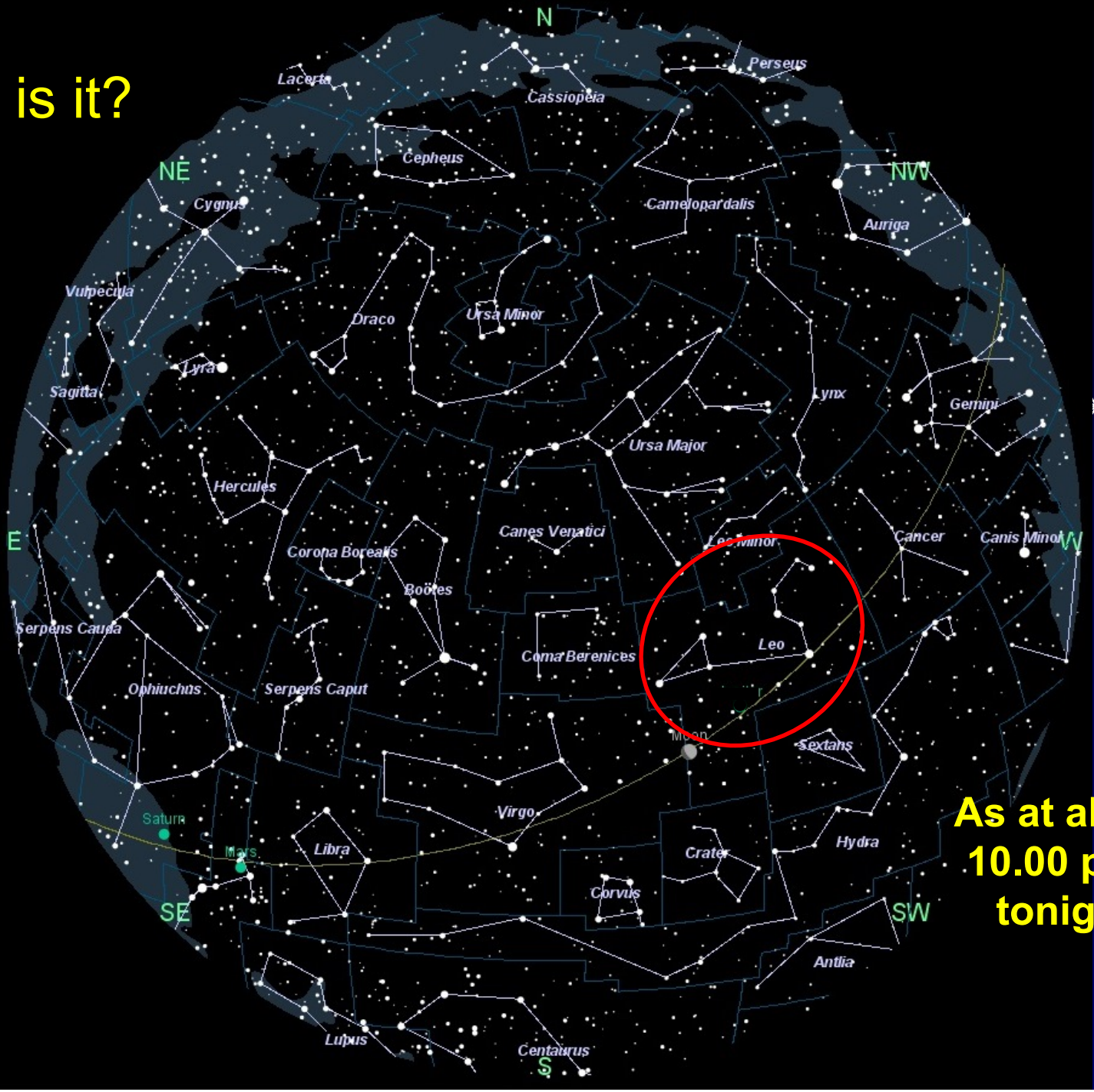
OUT INTO SPACE

Approved by A. Hunter, Ph.D., Sec. Royal Astronomical Society

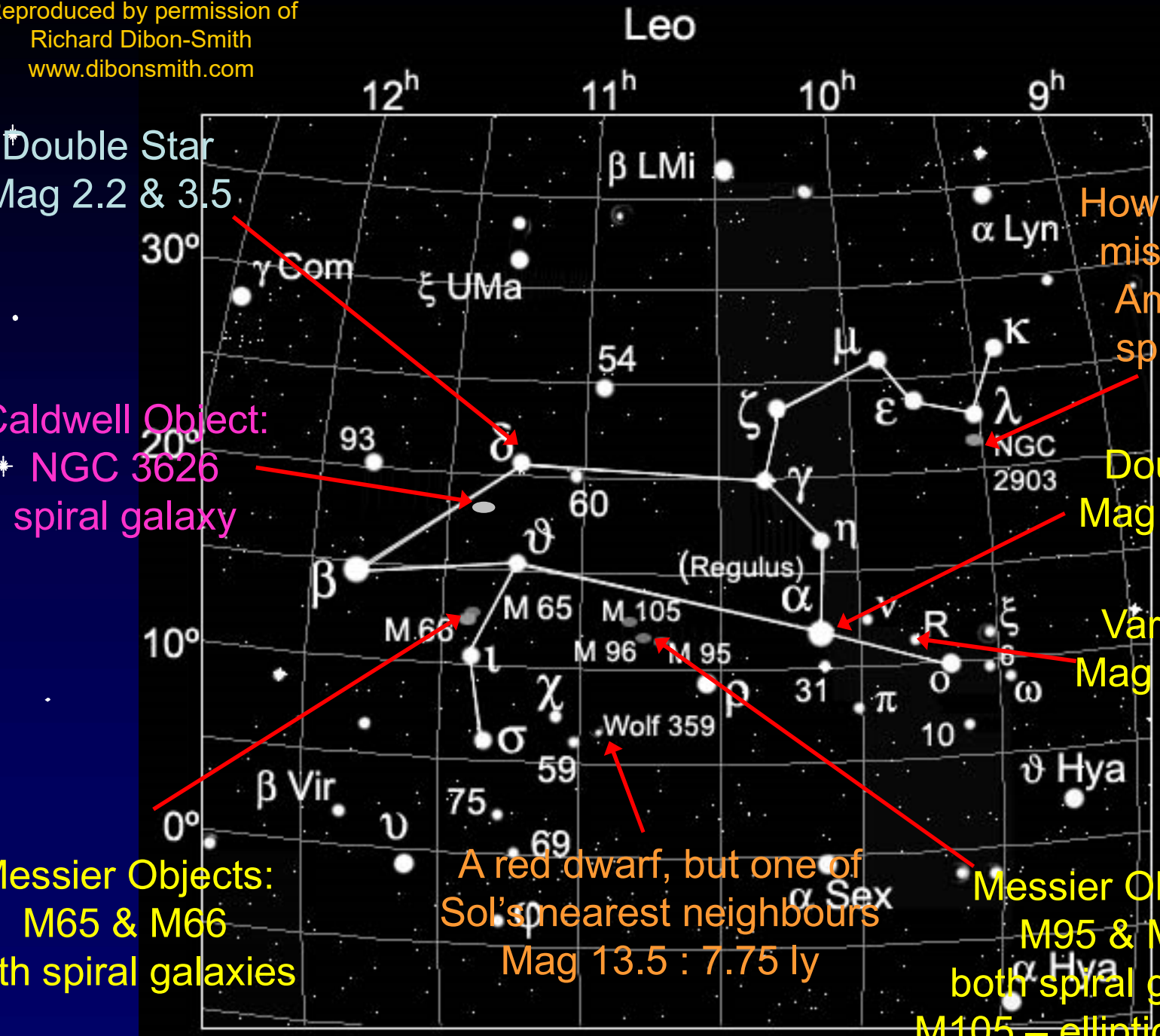
LEO

Leo (Lion), fifth sign of the Zodiac, is bounded on the West by Cancer, on the East by Virgo. It is easy to locate . . . a straight line from the Pole Star to Plough Pointers leads to Leo. February to end of June is good time for viewing, but evenings in March and April are best. Principal and very prominent star is Regulus . . . also known as Cor Leonis (Lion's Heart) or Royal Star. Regulus, Gamma Leonis and several smaller stars form a group shaped like a sickle. From near these stars most of November meteor showers known as Leonids radiate.

Where is it?



As at about 10.00 p.m. tonight



Double Star
Mag 2.2 & 3.5

How did Messier miss this one? Another nice spiral galaxy

Caldwell Object:
NGC 3626
spiral galaxy

Double Star
Mag -0.7 & 7.7

Variable Star
Mag 4.4 → 11.3

Messier Objects:
M65 & M66
both spiral galaxies

A red dwarf, but one of Sol's nearest neighbours
Mag 13.5 : 7.75 ly

Messier Objects:
M95 & M96
both spiral galaxies
M105 – elliptical galaxy

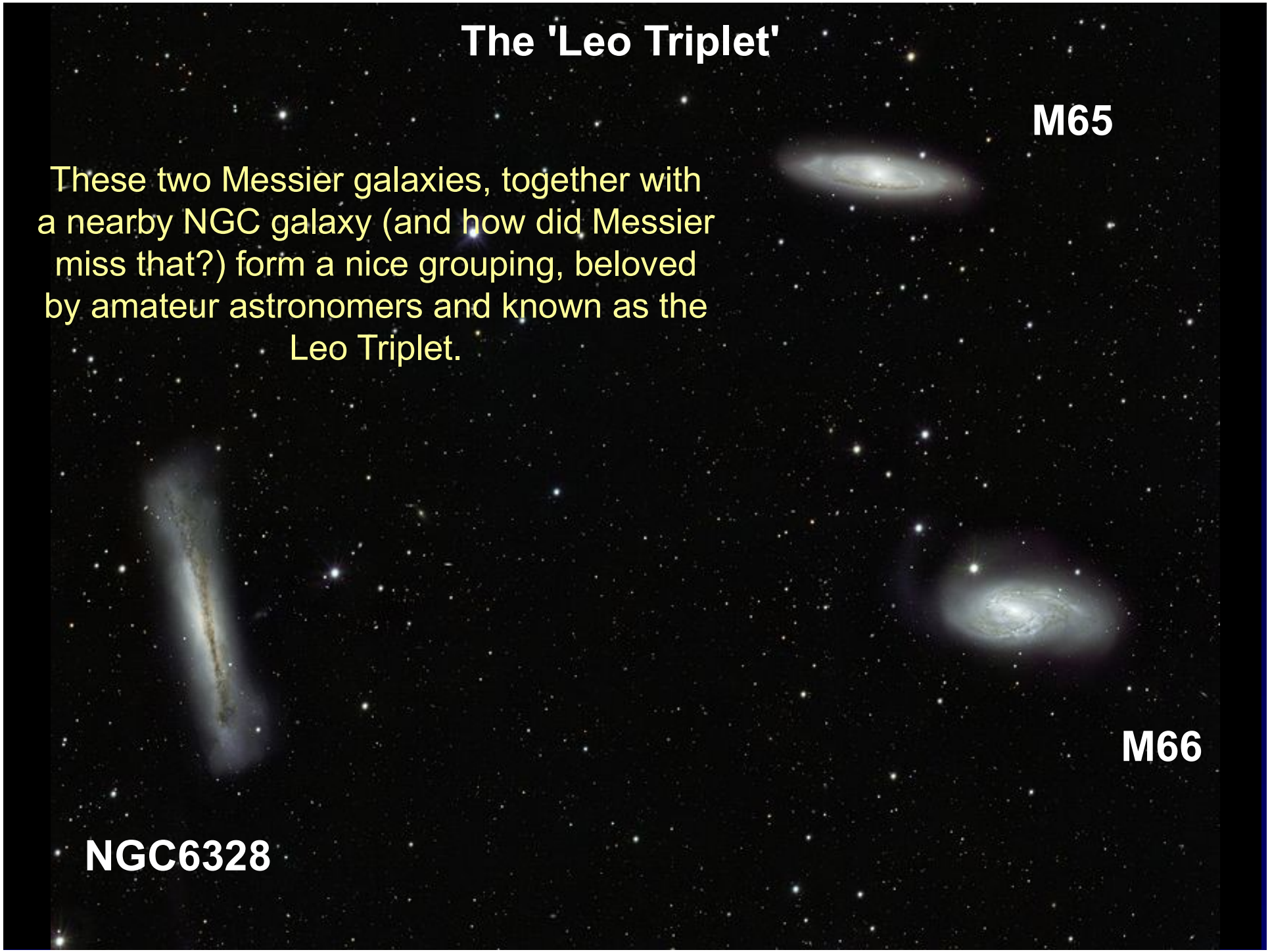
Messier Objects in Leo

M65 (NGC 3623)
Spiral Galaxy

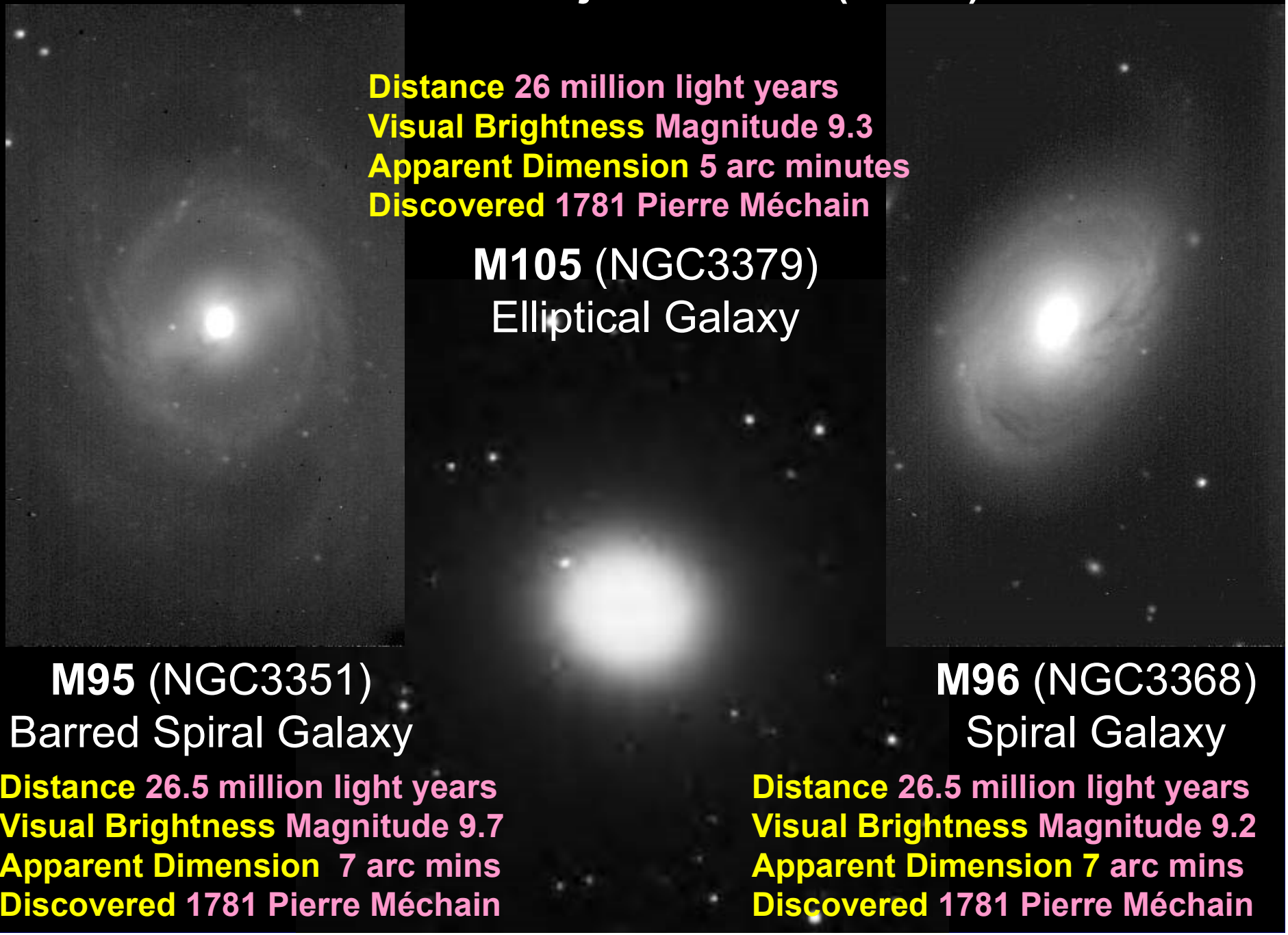
Distance 24 million light years
Visual Brightness Magnitude 9.3
Apparent Dimension 9 arc minutes
Discovered 1780 Pierre Méchain

M66 (NGC 3627)
Spiral Galaxy

Distance 21.5 million light years
Visual Brightness Magnitude 8.1
Apparent Dimension 9 arc minutes
Discovered 1780 Pierre Méchain


The 'Leo Triplet'
M65
These two Messier galaxies, together with a nearby NGC galaxy (and how did Messier miss that?) form a nice grouping, beloved by amateur astronomers and known as the Leo Triplet.
M66
NGC6328

Messier Objects in Leo (contd)



M105 (NGC3379)
Elliptical Galaxy

Distance 26 million light years
Visual Brightness Magnitude 9.3
Apparent Dimension 5 arc minutes
Discovered 1781 Pierre Méchain

M95 (NGC3351)
Barred Spiral Galaxy

Distance 26.5 million light years
Visual Brightness Magnitude 9.7
Apparent Dimension 7 arc mins
Discovered 1781 Pierre Méchain

M96 (NGC3368)
Spiral Galaxy

Distance 26.5 million light years
Visual Brightness Magnitude 9.2
Apparent Dimension 7 arc mins
Discovered 1781 Pierre Méchain

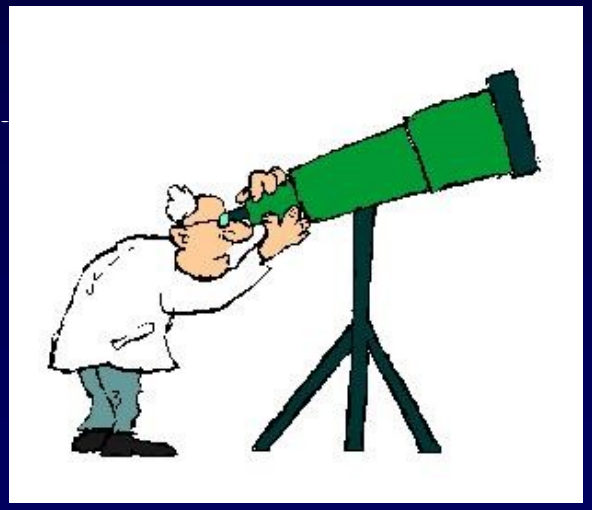
Caldwell Object in Leo

C40 (NGC3626) Lenticular Galaxy

Distance 86 million light years
Visual Brightness Magnitude 11
Apparent Dimension 3 arc minutes
Discovered 1784 William Herschel

What's Up!

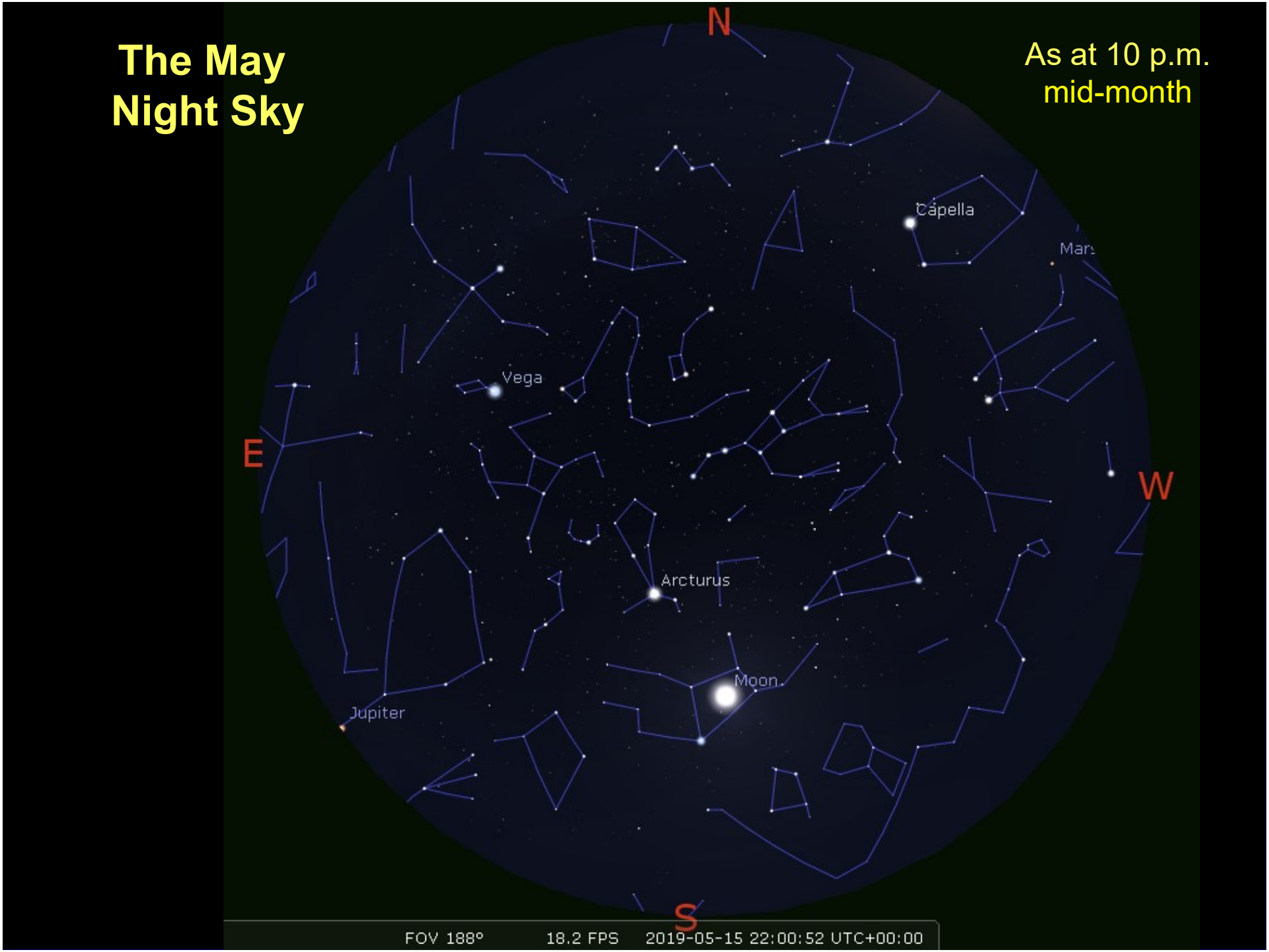
For May 2019



Woking Area U3A
Astronomy Group

The May Night Sky

As at 10 p.m. mid-month



Sun & Moon in May

- New Moon 4th
- First Quarter 12th
- Full Moon 19th
- Last Quarter 26th

(BST)		Sun	Moon
1st	Rise	05.35	05.01
	Set	20.24	16.24
15th	Rise	05.12	16.24
	Set	20.46	04.32
31st	Rise	04.53	03.52
	Set	21.07	17.33

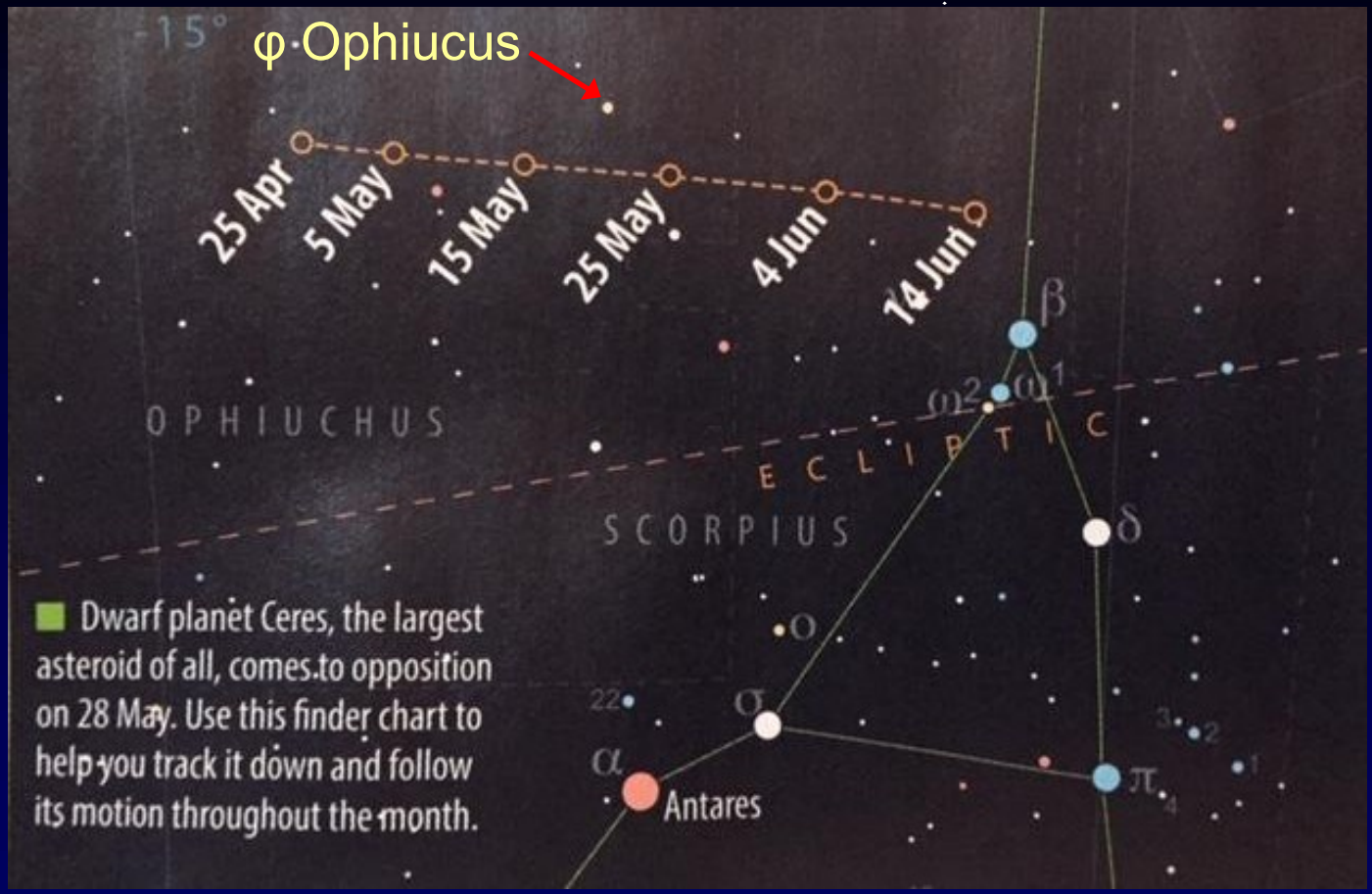
What's Up - Planets

- **Mercury**
  - Not well placed this month, but can be seen first as a morning object in the first week (but only 1° above eastern horizon), then as an evening object in the last week, at Mag -1.7 just above the north western shortly after sunset.
- **Venus**
  - A brilliant morning object at mag -3.8 but very low in the east, rising about ½ hr before sunrise at start of month, and by ¾ hr by end.
- **Mars**
  - Remains visible as an evening object throughout the month, but now showing a very tiny disc telescopically.

What's Up - Planets

- **Jupiter**
  - Rising by 01.00 hrs by mid-month, best seen around an hour later low in the South . Very bright at mag -2.4.
- **Saturn**
  - Another morning object, mag +0.8, best seen low in South South East about an hour before sunrise.
- **Uranus & Neptune**
  - Not visible this month
- **Ceres** (dwarf planet)
  - Brightens from mag 7.6 to mag 7 during month, not far from Phi (φ) Ophiucus, best seen in early hours

Dwarf Planet Ceres



- **Visual**
  - at mag 7.0 a telescope or good binos needed (10x50)
  - try sketching the stars seen on different nights.
- **Photographic**
  - take long exposure pics of same area on successive nights
  - compare to see apparent motion
  - use software to align and layer

Phenomena in May

- **2nd** Venus is 4½° north of crescent Moon
- **5th** Peak of Eta Aquarid meteor shower. Moon is favourable & theoretical max is 28/hour
- **7th** Mars is 4½° NNE of the waxing crescent Moon 
- **9th** Two stars occulted (will wink out) by Moon's dark limb
  - 10.11 pm, mag 6.5, HIP36152 
  - 10.30 pm, mag 5.2, 63 Geminorum 
- **18th** Mars passes through the edge of M35, the open cluster in Gemini. Low in west after sunset
- **23rd** Saturn just 2° from Moon before dawn, in southeast.

Meetings at Local Societies

- **Guildford AS** *Lecture Theatre L, Uni of Surrey*
  - Thursday 2nd May, 7.30 p.m.
    - » **Jupiter and the Juno Mission**
      - » Dr John Rogers
        - » Director Jupiter Section, BAA

Meetings at Local Societies

- **Farnham AS** *Aldershot Cricket Club*
  - Tuesday 14th May, 7.45 p.m.
    - **The Parker Solar Probe**
      - » Andrew Collins
        - » Farnham AS

Meetings at Local Societies

- **Croydon AS** *Royal Russell School, Coombe Lane, Croydon*
  - Friday 10th May, 19.45 hrs
    - Subject & Speaker - to be announced
  - Friday 24th May, 19.45 hrs
    - Society AGM

Meetings at Local Societies

- **Ewell AS** *Nonsuch High School for Girls, Cheam*
  - Friday 10th May, 19.45 hrs
    - **Venus**
      - David Fishwick.

Astronomy on TV

The Sky at Night

"Supermassive Black Hole"

It is thought that there is a supermassive black hole at the centre of almost every galaxy, including our own. This month the Sky at Night team look into Sagittarius A, the supermassive black hole at the Milky Way's centre, to discover what astronomers know about it. Plus they reveal the first ever direct image of a black hole, newly captured by the Event Horizon Telescope.

Sunday	12th May	BBC 4, 10.00 pm
Thursday	16th May	BBC 4, 7.30 pm

for exact times please check www.radiotimes.com
or www.bbc.co.uk/skyatnight


"That's all Folks!"