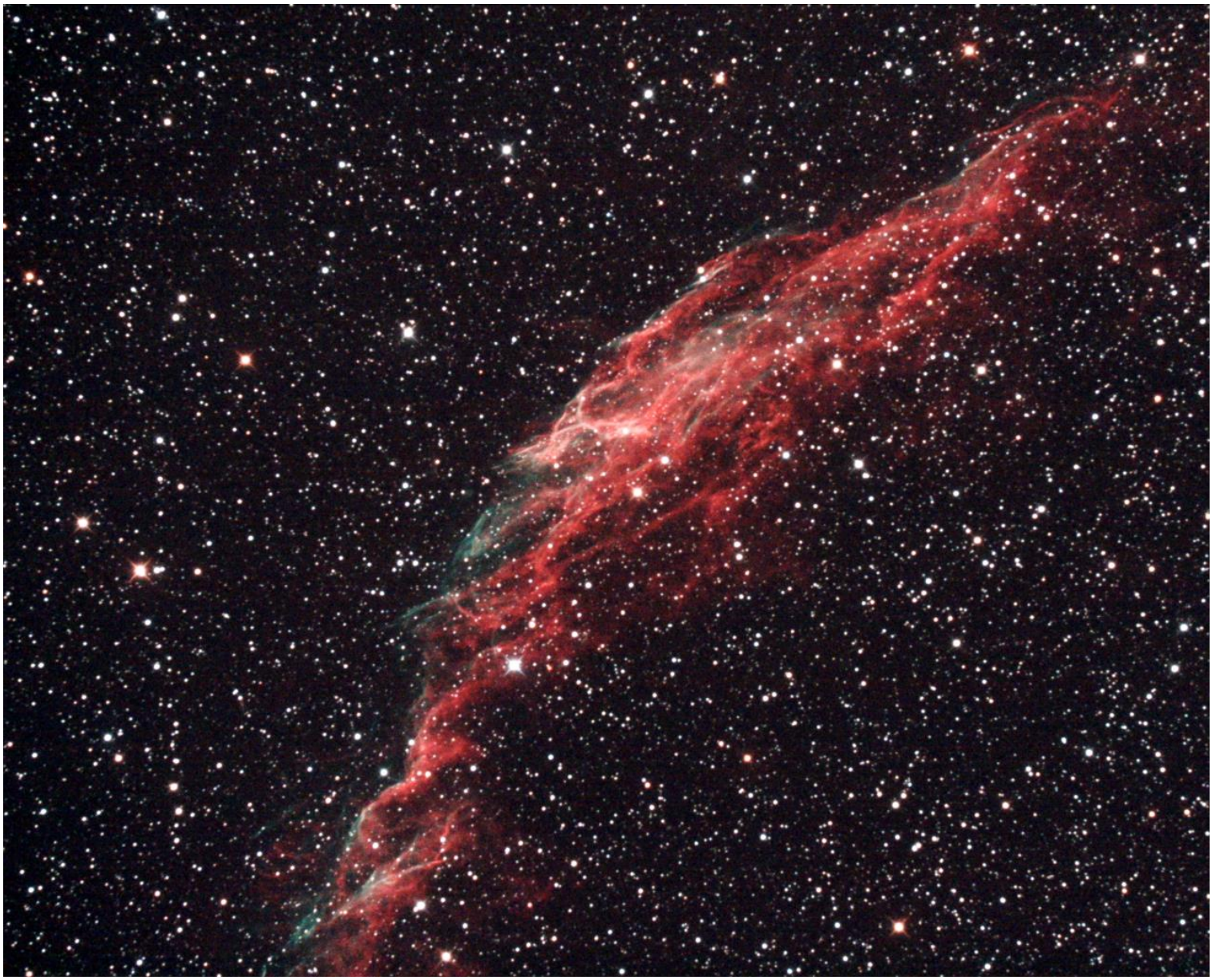

Header picture: The Sombrero Galaxy (M104)
Source: hubblesite.org

Cover Picture: The Veil Nebula
Taken by: Jurgen Schmoll

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Next Meeting:

Friday 10th October
7:15pm
At Wynyard Planetarium

The Decay of the Universe

By Prof. Ruth Gregory
Durham University

Cleveland & Darlington Astronomical Society

Editorial

Welcome to the October issue of Transit.

This month we struggled for articles, but many thanks to Rod Cuff for completing the 3rd in his *Life in the Skies* series of articles. Thanks also to Jurgen Schmoll, Michael Tiplady and John McCue for their images.

We have also reproduced an article from Universe Today (with their kind permission) on the arrival of India's first interplanetary spacecraft.

Any photo's or articles for next month would be most welcome, but I would also like to ask you the readers what you would like to see in future issues of Transit. Does anyone want to see articles for beginners, or more about practical subjects , finding your way round the night sky, Astronomical History, Current News.
Any comments or suggestions would be most welcome.

Regards
Jon Mathieson
Email: Jon.Mathieson@jonm.net Phone: +44 7545 641 287
Address: 12 Rushmere, Marton, Middlesbrough, TS8 9XL

New Members

A big welcome to the new members who joined us in september:

Babera Odziomek

Phil & Luke Murray

The Hewapthirani Family: Sansith, Sanjaya, Thushari & Sathsarini

Peter Perkins

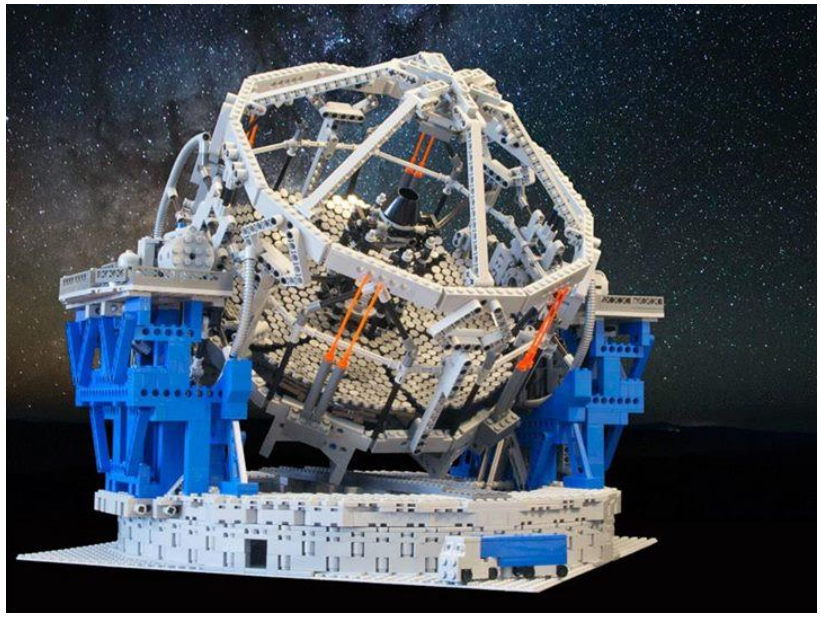
Teresa Threadgall

Janice Brett

David Scoones

Feras Tuma

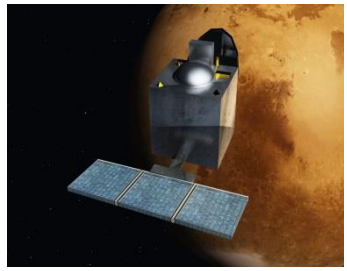
Dutch astronomer Frans Snik of the European Southern Observatory (ESO) has built his own version of the E-ELT using Lego.
The model is approximateley 1:150 scale and consists of 5274 parts.



In the News last month

MAVEN

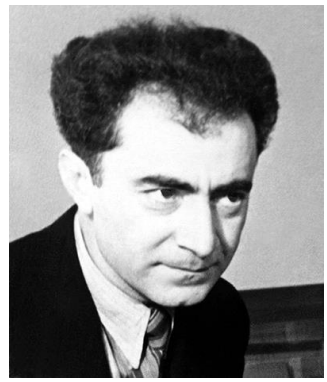
NASA's **M**ars **A**tmosphere & **V**olatile **E**volutio**N** mission reached Mars on Monday 22nd September closely followed by India's **M**ars **O**rbiter **M**ission which arrived on Tuesday 23rd.



MOM

A Life in the Sky – 3: Benik Markarian

By Rod Cuff



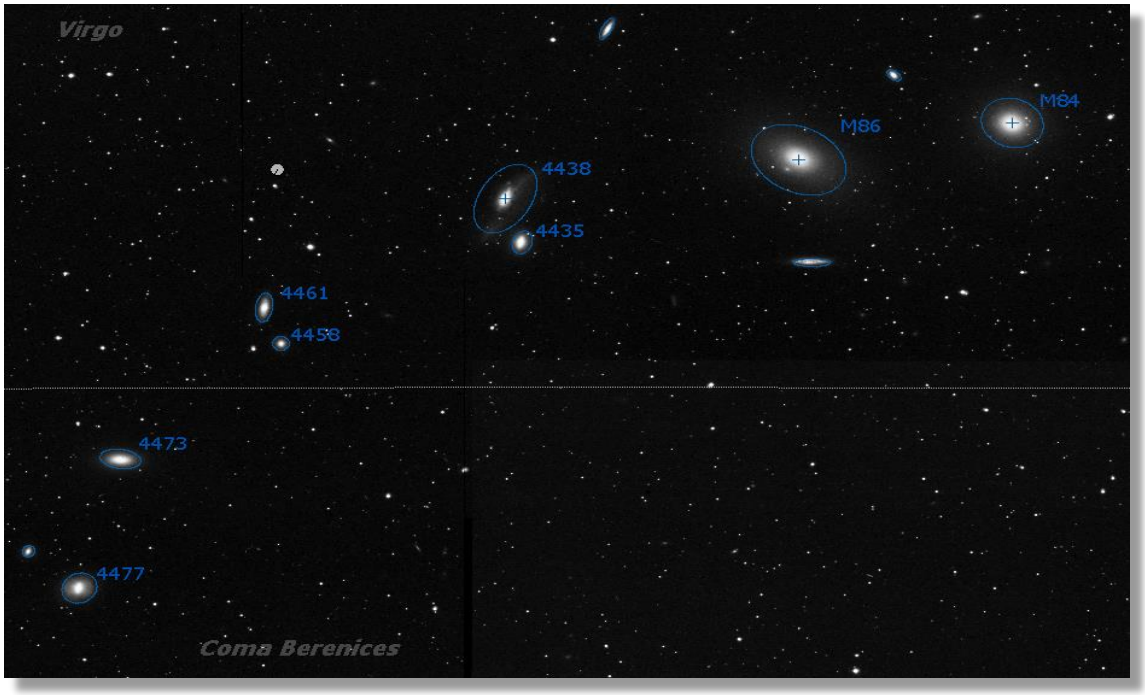
Things to Observe: **Markarian's Chain ..... Markarian Galaxies**

Beniamin ('Benik') Egishevitch Markarian (1913–85) was an Armenian astrophysicist and one of the 20th century's best astronomical observers. Although amateurs may know his name from its attachment to a spectacular chain of galaxies strung across nearly a degree and a half of sky, his main contribution to astronomy was as author of two famous surveys (the First and Second Byurakan Surveys) of compact, optically bright galaxies and as the discoverer of about 1500 of them.

Born in Georgia, at the age of 19 Markarian went to study maths at Yerevan State University in Armenia and, apart from conscription to the Soviet Army in 1941, remained in that country for the rest of his life. After World War II, he became involved in the search for a prime location for a new observing site in Armenia, and subsequently was one of the founders and organisers of the Byurakan Astrophysical Observatory. He personally commissioned and brought to first light all the Observatory's telescopes, thus providing a solid platform for Armenian astronomy.
He became the Acting Director in 1953, but a few years later voluntarily relinquished the position in order to get back to practical research as Head of the Department of Stellar (and later Extragalactic) Astronomy. In 1952 he published an *Atlas of stellar clusters of various types*, widely used around the world despite being in Russian.

Markarian for todays observer

MARKARIAN'S CHAIN is a stretch of galaxies that forms part of the Virgo Cluster. When viewed from Earth, the galaxies lie along a smoothly curved line that's just under 1.5° as the celestial crow (Corvus?) flies from one end (M84) to the other (NGC 4477). Markarian discovered in 1961 that at least seven of them appear to move coherently (share a common motion). The original paper was:
Markarian, B.E. (1961). Physical chain of galaxies in the Virgo cluster and its dynamic instability. *Astronomical Journal* 66: 555–557. Bibcode: 1961AJ.....66..555M.
Observing notes: The chain straddles the border between Virgo and Coma Berenices (marked with a white line in the illustration here, which is a composite of DSS [Digitised Sky Survey] downloads displayed using SkyTools 3). With a decently dark sky, an 8–10" reflector or SCT using a low-powered eyepiece should reveal the chain well.

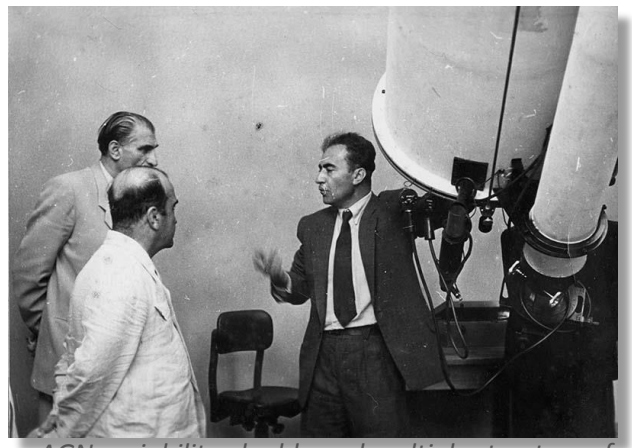


If you need to use setting circles to position your telescope, a good place to start is RA 12h 27m, Dec +13° 10'. Below are some details about the eight galaxies of the chain, going from top right to bottom left. A mosaic of images captured with a DSLR or CCD camera can be spectacular, as many amateur examples on the web confirm.

Galaxy	Type	Orientation	Apparent size	Magnitude
M84	Elliptical	Nearly face-on	6.3'	10.1
M86	Elliptical	Intermediate	10'	9.8
NGC 4438	Spiral	Intermediate (*)	8.9'	10.9
NGC 4435	Barred lenticular	Intermediate (*)	3'	11.5
NGC 4461	Lenticular	Nearly edge-on	3.7'	11.9
NGC 4458	Elliptical	Nearly face-on	95"	12.9
NGC 4473	Elliptical	Edge-on	4.1'	11.1
NGC 4477	Barred lenticular	Nearly face-on	3.9'	11.3

(*) These two have been given the nickname of 'The Eyes' because of their appearance through a telescope.

MARKARIAN GALAXIES are a class of compact, optically bright galaxies that have nuclei with a large flux of ultraviolet emission compared with other galaxies. Markarian drew attention to these types of galaxies in 1963 and soon decided to search systematically for them using the 132 cm Schmidt telescope at the Byurakan Astrophysical Observatory. Over the next 15 years or so, he and his colleagues compiled and published a catalogue with 1500 entries down to magnitude 17.5, which other astronomers subsequently referred to as 'Markarian galaxies'.



The nuclei of the galaxies have a blue colour that does not match the rest of the galaxy. The spectrum tends to show a continuum that Markarian concluded was produced by non-thermal radiation. Indeed, there are many peculiar objects in the catalogues. Here is an edited quote from the fully descriptive website on the Digitised First Byurakan Survey:

There are more than 200 Seyferts, dozens of QSOs [quasars], a few hundreds of starburst and HII galaxies, BL Lacertae objects, radio, infra-red and X-ray sources among them. More than 2500 scientific papers have been published on studies of these objects [concerning the] understanding of AGN [active galactic nuclei] phenomena, starburst activity and evolution of galaxies, high-luminosity IR radiation, AGN variability, double and multiple structure of the nucleus, composite spectrum AGN, galaxy interactions and merging, connection between different types of active galaxies, early stages of the evolution of galaxies, and other important topics of modern extragalactic astronomy. Studies of Markarian galaxies have revealed many new Seyferts and spectral classifications.

The Byurakan Surveys listing and analysing these objects were digitised in the early years of this century in conjunction with Cornell University (USA) and the University of Rome.

***Observing notes*:** Many of the Markarian galaxies are too faint for easy observation by typical amateur telescopes, and I've not yet found a source that can generate a list sorted by (for example) magnitude, but the interested reader can do some research using a good modern data source such as SkyTools 3. For example, **MKN 501** (also known as PGC 59214) is a compact galaxy in Hercules (RA 16h 53m 52s, Dec +39° 45' 37") 71 arcsec across and magnitude 13.4, which should be a reasonable CCD target for something like a 10" telescope. It's a prodigiously powerful blazar, one of the few known sources emitting continuous radiation at the TeV (tera-electron-volt) level – the sort of power that the Large Hadron Collider can generate for a fraction of a second.

Markarian 533 (NGC 7674) in Pegasus looks well worth looking out for too. The picture below is from Hubble, so don't expect miracles from your own kit, but at mag. 14.0 and 64" wide the galaxy is a good CCD target. It's the face-on spiral here, with the other three objects making up the Hickson 96 compact group of galaxies, which interact tidally. NGC 7674 has a powerful AGN (a type-2 Seyfert), probably powered by gas drawn in from its companions.

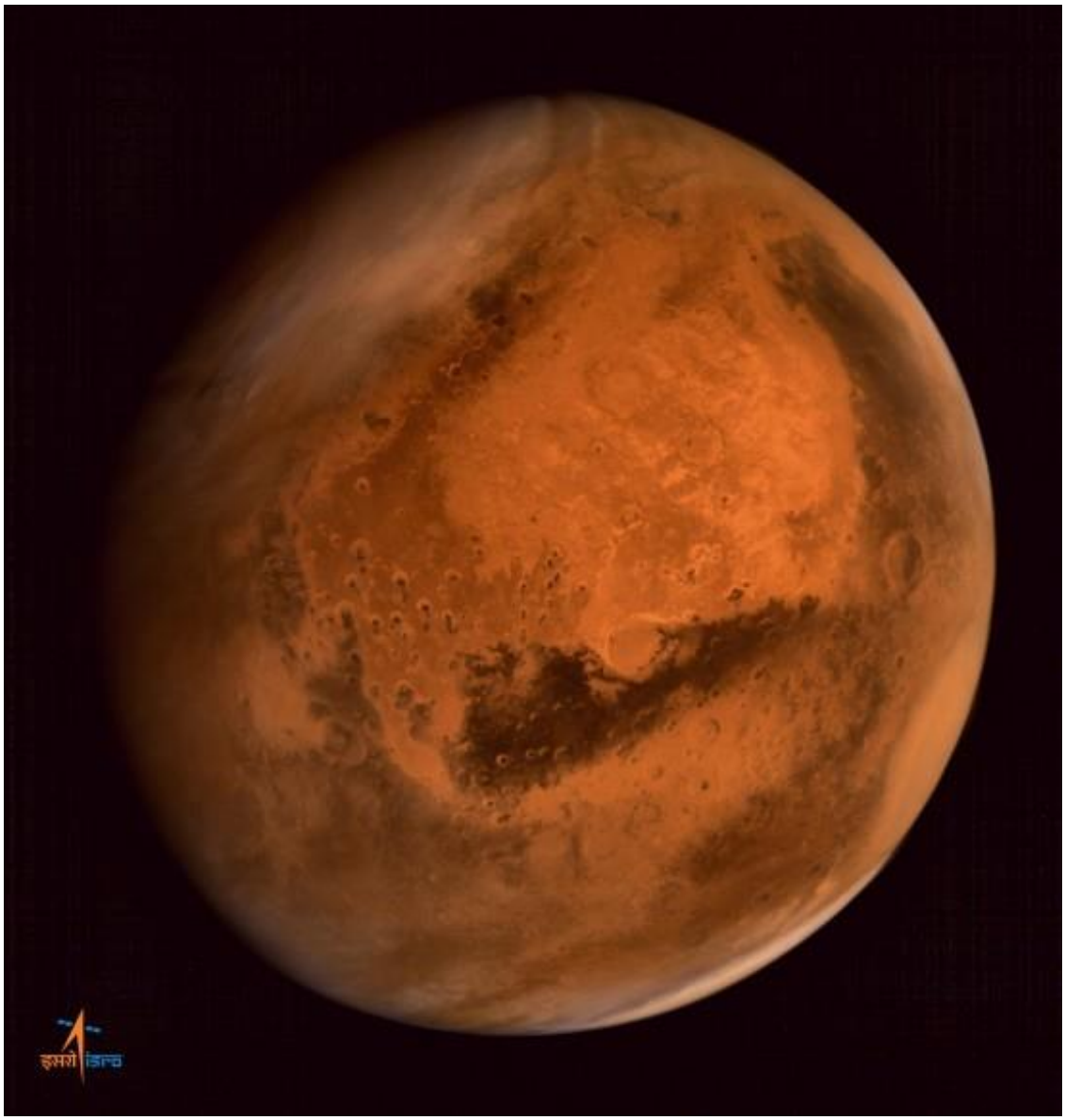
Credit: NASA, ESA, the Hubble Heritage (STScI/AURA)-ESA/Hubble Collaboration, and A. Evans (University of Virginia, Charlottesville/NRAO/Stony Brook University)

Markarian 421, a BL Lacertae object in Ursa Major, hit the astronomical headlines in April 2013 when it suddenly flared in the gamma-ray spectrum, to give the brightest display of gamma rays ever seen. It's relatively close to Earth ('only' about 400 million light-years away), and one of the brightest quasars in the night sky. At a mean magnitude of about 13.3, it's another Markarian galaxy that's accessible to amateur telescopes and cameras.

India's MOM Snaps Spectacular Portrait of New Home

The Red Planet

By Ken Kremer - Universe Today (www.universetoday.com)



ISRO's Mars Orbiter Mission captures spectacular portrait of the Red Planet and swirling dust storms with the on-board Mars Color Camera from an altitude of 74500 km on Sept. 28, 2014. Credit: ISRO

For her latest eye popping feat, India's Mars Orbiter Mission (MOM) has snapped the first global portrait of her new Home – the Red Planet.

MOM is India's first interplanetary voyager and took the stupendous new image on Sept. 28, barely four days after her historic arrival on Sept. 23/24 following the successful Mars Orbital Insertion (MOI) braking maneuver.

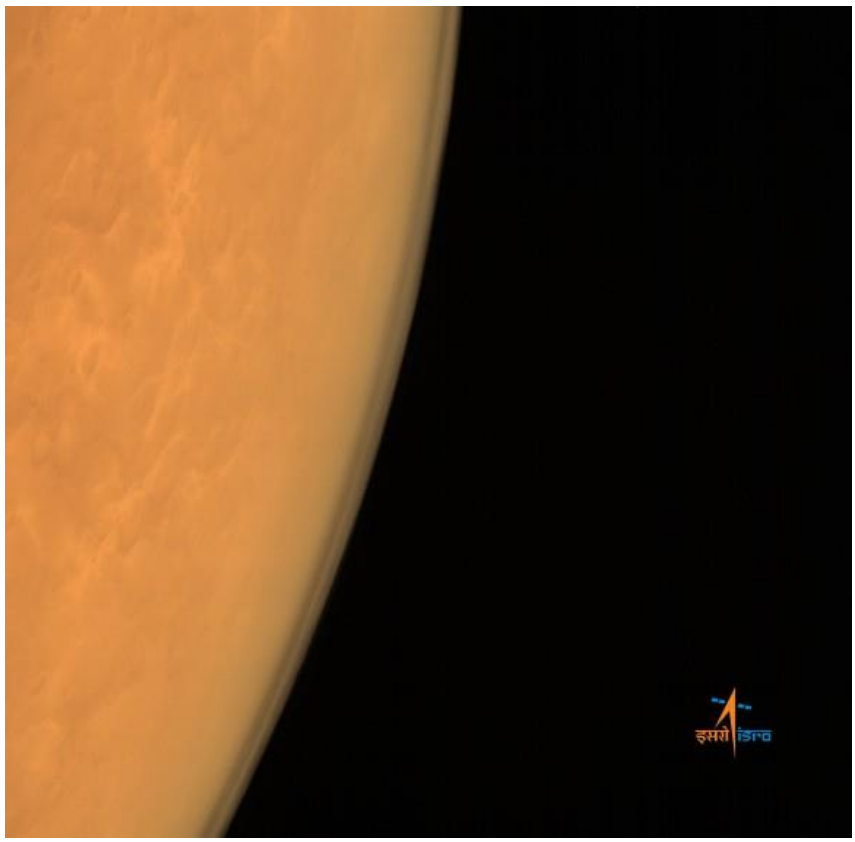
The MOM orbiter was designed and developed by the Indian Space Research Organization (ISRO), India's space agency, which released the image on Sept. 29.

Even more impressive is that MOM's Martian portrait shows a dramatic view of a huge dust storm swirling over a large patch of the planet's Northern Hemisphere against the blackness of space. Luckily, NASA's Opportunity and Curiosity surface rovers are nowhere nearby.

"Something's brewing here!" ISRO tweeted.

The southern polar ice cap is also clearly visible.

It was taken by the probe's on-board Mars Color Camera from a very high altitude of 74,500 kilometers.



ISRO's Mars Orbiter Mission captures the limb of Mars with the Mars Color Camera from an altitude of 8449 km soon after achieving orbit on Sept. 23/24, 2014. Credit: ISRO

When MOM met Mars, the thrusters placed the probe into a highly elliptical orbit whose nearest point to Mars (periapsis) is at 421.7 km and farthest point (apoapsis) at 76,993.6 km. The inclination of the orbit with respect to the equatorial plane of Mars is 150 degrees, as intended, ISRO reported.
So the Red Planet portrait was captured nearly at apoapsis.
This is the third MOM image released by ISRO thus far, and my personal favorite. And its very reminiscent of whole globe Mars shots taken by Hubble.
MOM's goal is to study Mars' atmosphere, surface environments, morphology, and mineralogy with a 15 kg (33 lb) suite of five indigenously built science instruments. It will also sniff for methane, a potential marker for biological activity.
The $73 million mission is expected to last at least six months.
MOM's success follows closely on the heels of NASA's MAVEN orbiter which also successfully achieved orbit barely two days earlier on Sept. 21 and could last 10 years or more.
With MOM's arrival, India became the newest member of an elite club of only four entities who have launched probes that successfully investigated Mars – following the Soviet Union, the United States and the European Space Agency (ESA).

Members Photo's

John McCue

Here's a photo I took of Cleomedes, on the edge of the Mare Crisium, on Sep. 11 this year.
I bought a Celestron digital microscope viewer that slots into the eyepiece draw tube and found to, to my delight, that it also works in the draw tube of my 8" Meade f/10 SCT.

Cleomedes is 126 km. wide and named after the first century BC Greek author

Michael Tiplady

A couple of photos taken by michael using his I-Phone held up to the eyepeice of his Telescope
The lower two photos show the same image before and after editing.

Jurgen Schmoll

C2014E2 Jacques

NGC7331 Stephan

M16

M33

M11

The Transit Quiz

Every answer starts with the letter “S”
As usual, they are in roughly increasing order of difficulty.

1. The common name of M104.

2. The only constellation named after a weapon.

3. A compact group of five galaxies in Pegasus, which are probably interacting – a challenging target for amateurs with big telescopes.

4. The only astronaut to fly on a Mercury, a Gemini and an Apollo mission.

5. The radius to which a body of a given mass must collapse, to become a black hole.

6. An empirical law concerning the variation of the latitudes of sunspots, graphically represented by the Butterfly Diagram.

7. The Greek astronomer who advised Julius Caesar on the introduction of leap years.

8. It began life as Sanduleak -69°202.

9. The biggest crater on Phobos.
(Give yourself a bonus point, if you know who the person was, after whom it’s named.)

10. A famous German-Russian family, which included five accomplished astronomers in four generations!

September's Quiz Answers

1. The first star which was known to be variable.
Mira (o Ceti).

2. A small constellation, named after a very small creature.
Musca, the Fly.

3. The body on which is found the highest cliff in the Solar System.
Miranda, a satellite of Uranus. The cliff, or scarp, is Verona Rupes, an incredible 21 km high!

4. A major observatory, operated by the University of Texas.
McDonald Observatory

5. The only feature on Venus named after a man!
Maxwell Montes, named after James Clerk Maxwell. Apart from the unimaginatively named Alpha Regio and Beta Regio, all other features on Venus are named after goddesses or famous women,

6. The man who didn't fly on Apollo 13.
Ken Mattingly, who was dropped from the crew and replaced with his backup

7. A curved string of galaxies within the Virgo Cluster.
Markarian's Chain.

8. The man who discovered about half as many "Messier objects" as Messier himself.
Pierre Méchain (1744-1805). Charles Messier's catalogue includes many objects which he didn't discover himself. His friend Méchain is credited with discovering 30 of them.

9. The astronomer who discovered the variability of Algol.
Geminiano Montanari (1633-87) in 1669. (Not John Goodricke; he famously *explained* its variability.)

10. The unofficial name given by astronaut Gus Grissom to his Gemini 3 spacecraft.
Molly Brown.

No. 6 and 10 require a little explanation, for those who don't know the history!

No. 6: Each Apollo mission had two crews, prime and backup, which trained in parallel, so that if any member of the prime crew was unable to fly, he could be replaced by his counterpart from the backup crew. Ken Mattingly was Command Module Pilot of the prime crew.
A few days before launch, Charlie Duke, who was a member of the backup crew, became ill with measles. As the crews had been working closely together, the prime crew had also been exposed to it. Jim Lovell and Fred Haise had had measles as children, and were therefore immune, but Mattingly had not – so there was a risk that he had been infected (it turned out that he had not), and if so, he would have become ill during the flight. So he was dropped from the crew, and replaced by his backup, Jack Swigert.
Each backup crew became the prime crew for three missions later – so Mattingly later took Swigert's place on Apollo 16.

No. 10: Gus Grissom was the first man to go into space twice. He made the second manned Mercury flight, then commanded the first manned Gemini mission. At the end of his Mercury flight, after splashdown, the hatch accidentally blew open, and his capsule filled with water and sank.
The Gemini spacecraft were not given individual names, as the Mercury ones had been - but Grissom unofficially named his after "the unsinkable Molly Brown", a survivor of the *Titanic*, who was immortalised in a Broadway musical.

Cleveland and Darlington Astronomical Society

Meeting Calendar
2014-2015

10th October 2014	**The Decay of the Universe** Prof. Ruth Gregory of Durham University
14th November 2014	**Atmospheric Optics** Dave Newton of Sunderland Astronomical Society
12th December 2014	**X-Raying the Universe** **The Hot and Violent Sky** Dr Tim Roberts of Durham University
9th January 2015	**Your First Telescope** Dr Jurgen Schmoll, CaDAS Chairman
13th February 2015	**Astrophotography** Keith Johnson, CaDAS
13th March 2015	Title to be confirmed Gary Fildes of Kielder Observatory
10th April 2015	Title to be confirmed To be confirmed
8th May 2015	Title to be confirmed Paul Money FRAS, FBIS
12th June 2015	**CaDAS Annual General Meeting and Social Evening** Venue to be confirmed

All meetings are held at the Wynyard Planetarium (with the exception of the AGM).
Doors Open at 19:15 for a 19:30 start