CELEBRATING 40 YEARS 1978 - 2018

The Messenger

Mexborough & Swinton Astronomical Society

August 2018

The Nakshatras

There are 27 nakshatras in Hindu astronomy each representing a "lunar mansion" (The position that the moon is located each day). Each nakshatra will cover 13° 20' of the ecliptic. Their names of the nakshatras are related to the most prominent asterisms in the respective sectors.
The start of the nakshatras list is the point on the ecliptic directly opposite to the star Spica called Chitrā in Sanskrit, which would be Ashvinī, an asterism that is part of the modern constellation Aries.
The position of these "asterisms" are first noted in the early Indian text ***Vedanga Jyotisha*** dated to about 700BCE, but based on tradition dated back to 1400BCE.
This earliest astronomical text, Vedānga Jyotiṣha, details several astronomical attributes generally applied for timing social and religious events. The Vedānga Jyotiṣha also details astronomical calculations, calendrical studies, and establishes rules for empirical observation. Since the texts written by 1200 BCE were largely religious compositions the Vedānga Jyotiṣa has connections with Indian astrology and details several important aspects of the time and seasons, including lunar months, solar months, and their adjustment by a lunar leap month of Adhimāsa. Rituals are also described to take place on each Nakshatra dependant on in which of the twenty-seven constellations, eclipses, and seven planets were arranged.

The 27 nakshatras are called:-

Kṛttikā (the Pleiades)	Uttara phalguni (Denebola)	Uttara ashadha
Rohinī (Aldebaran)	Hasta	Shravana
Mrigashīrsha	Chitrā (Spica)	Dhanishta
Ārdrā (Betelgeuse)	Svāti (Arcturus)	Satabhishak (Sadachbia)
Punarvasu	Vishākhā	Purva bhadrapada
Pushya	Anurādhā	Uttara bhadrapada
Asleshā	Jyeshthā	Revati
Maghā (Regulus)	Mūla	Ashvini
Purva phalguni	Purva ashadha	Bharani

These "lunar mansions" have great astrological and religious beliefs attached, just as the western constellations do. For example …..

Bharani is the second nakshatra in Hindu astronomy; Bharani is ruled by Shukra (the planet Venus). Also, it is classified as a Cruel or Active nakshatra, meaning that, under astrological beliefs, works of a harmful or deceptive nature are best conducted while the moon is Bharani. Bharani is seen as being under the domain of Yama, the god of death or Kālī.

In traditional Hindu scriptures, the creation of the nakshatras is attributed to Daksha. They are personified as daughters of Daksha and as wives of Chandra known as the Moon God who reluctantly married the 26 other nakshatra's on Daksha's request even though he was only interested to marry Rohini (represented in the sky by Aldebaran).

Binocular Challenge

The Plough's familiar shape appears halfway up the north-western sky as darkness falls. One of the summer sky's finest binocular double stars marks the bend of the Dipper's handle. Mizar shines at 2nd magnitude, some six times brighter than its 4th-magnitude companion, Alcor.
A Good pair of binoculars may reveal Mizar itself as double — and these components do orbit each other.
Now we are looking at adding to out "Messier Challenge" list – and the chart on the wall is a little thin at the moment! So let's see if we can add a couple of "M" objects to the success rate.

M81 and M82

M81 is known as "Bode's Galaxy" and has a magnitude of about 7; M82 is known as "The Cigar Galaxy" and has a magnitude of 8½.
Look for the two "pointer" stars in the Plough, and follow the line towards Polaris, about a third of the way along move out about a degree (two moon diameters) and search that spot. You should see two "fuzzy" spots. M81 is the more rounded one and closer to the plough.

M81 is a spiral galaxy (though you won't see the spiral shape in binoculars) whilst M82 is an elongated irregular galaxy

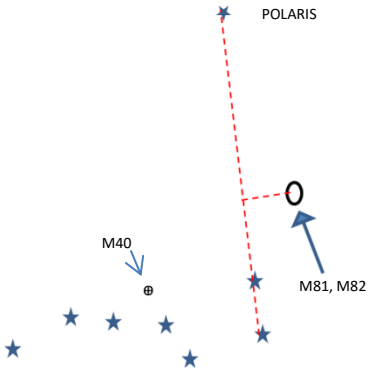
M40

Messier 40 (M40), also known as Winnecke 4 is a double star located in the constellation Ursa Major, the Great Bear. It is estimated at magnitude 8½. And is an easy split of two white stars in binoculars.

M40 is one of the few Messier objects that are not deep sky objects, but were catalogued by mistake.

Messier 40 is easy to find as it lies right next to Megrez, one of the bright stars that form the Big Dipper asterism in Ursa Major. Megrez is the star that connects the handle of the Big Dipper to the cup, or the star at the base of the Great Bear's tail.

M40 is located about 1.5 degrees northeast of Megrez and 17 arc minutes northeast of 70 Ursae Majoris, an orange giant star with a visual magnitude of 5.54.



Keep Your Eyes Open



Thursday August 6th **"Picturing the Planets"**

The planets - literally, from the Greek, "wanderers" in the night sky - have been the subject of study throughout the course of human history. Before the era of street lighting, the patterns of stars in the night sky, and the fact that a few of the brightest "stars" did not stay in these fixed patterns but instead moved across the sky over the course of the year, would have been very noticeable to anyone who spent much time outside after dark. In this talk I will try to explain how our picture of the planetary system has changed over the course of human history, and why it still remains a live subject of research today..



Saturday August 18th – Society Visit to Oxford

This will include a guided tour by Dr Allan Chapman.



Thursday September 27th **"Mars Part One"**

Paul will be regaling us with one of his excellent talks. This time taking us to the "Red Planet"

European Southern Observatory's Very Large Telescope



Understanding Press releases is so difficult; perhaps I'm just not clever enough!
The VLT has used its new adaptive optics mode called laser tomography -- and has captured remarkably sharp test images of the planet Neptune and other objects. However their press release is full of acronyms and press released non-explanations which make the reporting of this very difficult to put in simple terms! The MUSE (Multi Unit Spectroscopic Explorer) [How do they think these names up!] instrument working with the GALACSI [I have no idea what that acronym means!] adaptive optics module, can now use this new technique to correct for turbulence at different altitudes in the atmosphere. It is now possible to capture images from the ground at visible wavelengths that are sharper than those from the NASA/ESA Hubble Space Telescope. The ESO's information page is quoting

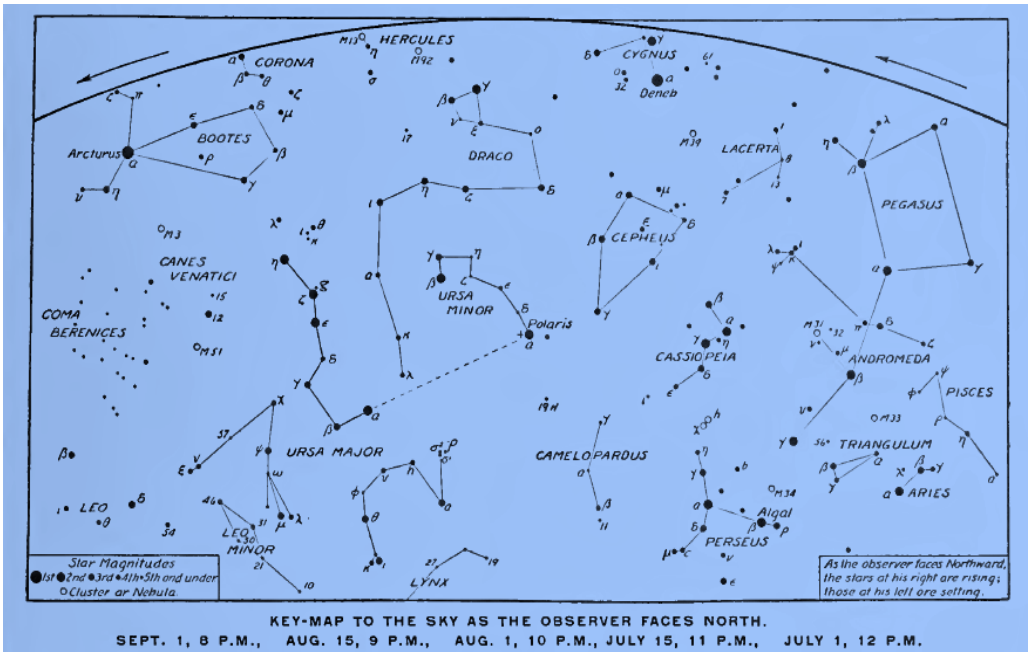
"GALACSI will use 4 Na-LGS (sodium Laser Guide-Stars) launched from the centre piece of a Unit Telescope of the VLT and the light re-emitted by the 80-100 km altitude Sodium layer is collected by 4 WFS (Shack Hartmann Wave Front Sensors) each with 40x40 subapertures. The slopes measured by the WFS are combined by the Real Time Computer SPARTA to estimate of the Wave Front Error introduced by the earth's atmosphere and to calculate the correction applied to the DSM. The AO-loop is closed at a 1000 Hz frequency.
GALACSI and GRAAL benefit from several common developments for the AOF and other applications. Specifically these are the DSM and the ASSIST test bench, 4-LGSF, NGC WFS camera and the SPARTA Real Time Computer platform."
So now we are all the wiser – here is a pretty picture of Neptune it took – pretty amazing really, let's just face it they got some expensive kit that works really well!

The August Sky Calendar

Thursday 2nd	α–Capricornid meteor shower (Very poor hourly rate!)
Saturday 4th	Moon at last quarter
Friday 10th	Moon at Perigee
Saturday 11th	New Moon, Partial Solar Eclipse, very north of Scotland in UK 2% coverage!
Monday 13th	Perseid Meteor shower, expected up to 50 per hour after midnight
Friday 17th	Moon passes close to 4° of Jupiter
Saturday 18th	Moon at first quarter
Tuesday 21st	Moon 2° north of Saturn
Sunday 26th	Full Moon

Mercury	Not Visible, greatest morning elongation on 26th – but still lost in dawn!
Venus	Close to horizon at sunset at start of month, becoming unobservable
Mars	Just past opposition, easily seen above south horizon. 24” angular size, mag -2.6
Jupiter	Bright in early evening, setting before midnight, 36” angular size
Saturn	Low in south, rings easily seen, 18” angular size, magnitude 0.2
Uranus	Rises just before midnight, magnitude 5.8, angular size 3.6”
Neptune	Rises late evening, 2.5” angular size, magnitude 7.8

Comet	C 21p/Giacobini-Zinner, expected to brighten to mag 7 by end of month. Starts August in Cassiopeia and moves quickly through Draco, then to Camelopardus. Check internet for location



Jupiter's Retinue Now Increased by 12!

There are now officially 79 moons in orbit around Jupiter. A team from the Carnegie Institute of Science, Washington DC, led by Scott S. Sheppard first spotted the moons in the spring of 2017 while they were looking for very distant Solar System objects as part of the hunt for a possible massive planet far beyond Pluto.

Amazingly Scott Sheppard is on the credit list for discovering no less than 59 of these 79 over the last 20 years!

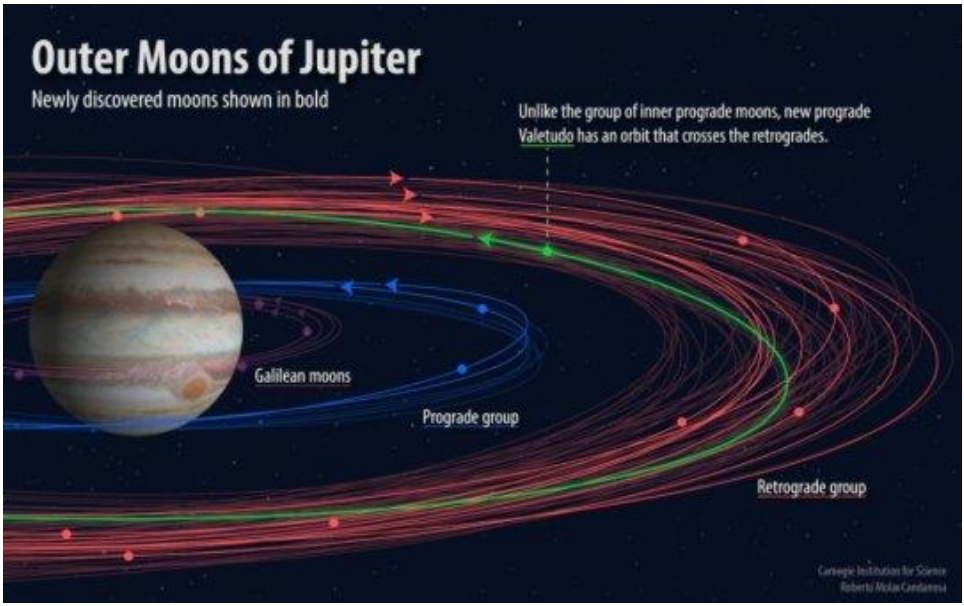
The initial discovery of most of the new moons were made on the Blanco 4-meter telescope at Cerro Tololo Inter-American in Chile and operated by the National Optical Astronomical Observatory of the United States. The telescope recently was upgraded with the Dark Energy Camera, making it a powerful tool for surveying the night sky for faint objects.

Nine of the new moons are part of a distant outer swarm of moons that orbit it in the retrograde, or opposite direction of Jupiter's spin rotation. These distant retrograde moons are grouped into at least three distinct orbital groupings and are thought to be the remnants of three once-larger parent bodies that broke apart during collisions with asteroids, comets, or other moons. The newly discovered retrograde moons take about two years to orbit Jupiter.

Two of the new moons have similar orbital properties and orbit prograde (the same direction as Jupiter's rotation). These moons are thought to also be fragments of a larger moon that was broken apart. These two newly discovered moons take 251 days to orbit around Jupiter. They are both about 2 km in Diameter, having inclinations of 30 degrees.

The twelfth moon in this list is also prograde but much farther out, and could be in future trouble as it is orbiting within the region of the retrograde moons. This "oddity" has been given a provisional name of Valetudo, the Roman Goddess of hygiene!

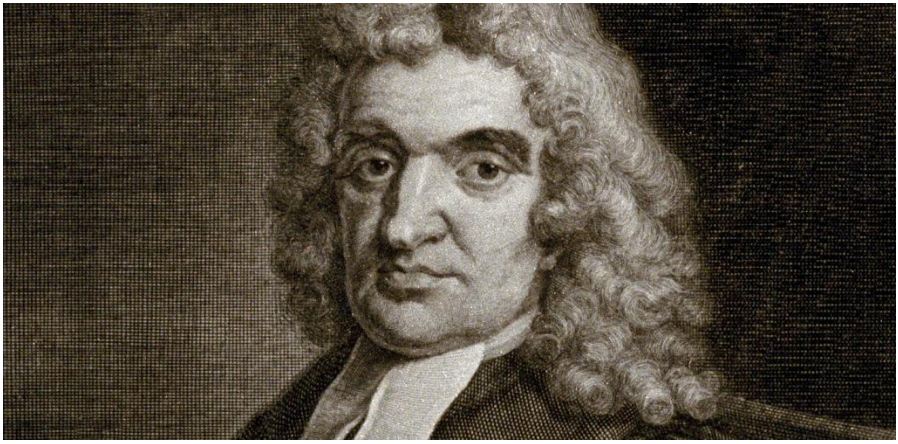
A diagram issued by Carnegie Institute is shown below showing the orbits of the newly announced discoveries.



John Flamsteed

John Flamsteed, who was born near Derby in 1646 and died at Greenwich in 1720.* unfortunately the character of his work was such that, marked as it was by no brilliant discoveries, it is difficult to present it in an attractive form or to give any adequate idea of its real extent and importance. He was one of those aborious and careful investigators, the results of whose work are invaluable as material for subsequent research, but are not striking in themselves.

He made some astronomical observations while quite a boy, and wrote several papers, of a technical character, on astronomical subjects, which attracted some attention. In 1675 he was appointed a member of a Committee to report on a method for finding the longitude at sea which had been offered to the Government by a certain Frenchman of the name of St. Pierre. The Committee, acting largely on Flamsteed's advice, reported unfavourably on the method in question, and memorialised Charles II. In favour of founding a national observatory, in order that better knowledge of the celestial bodies might lead to a satisfactory method of finding the longitude, a problem which the rapid increase of English shipping rendered of great practical importance.



The King having agreed, Flamsteed was in the same year appointed to the new office of Astronomer Royal, with a salary of £100 a year, and the warrant for building an Observatory at Greenwich was signed on June 12th, 1675. About a year was occupied in building it, and Flamsteed took up his residence there and began work in July 1676, five years after Cassini entered upon his duties at the Observatory of Paris. The Greenwich Observatory was, however, on a very different scale from the magnificent sister institution. The King had, it is true, provided Flamsteed with a building and a very small salary, but furnished him neither with instruments nor with an assistant. A few instruments he possessed already, a few more were given to him by rich friends, and he gradually made at his own expense some further instrumental additions of importance. Some years after his appointment the Government provided him with “a silly, surly labourer " to help him with some of the rough work, but he was compelled to provide more skilled assistance out of his own pocket, and this necessity in turn compelled him to devote some part of his valuable time to taking pupils.

Flamsteed's great work was the construction of a more accurate and more extensive star catalogue than any that existed; he also made a number of observations of the moon, of the sun, and to a less extent of other bodies. Like Tycho, the author of the last great star catalogue, he found problems continually presenting themselves in the course of his work which had to be solved before his main object could be accomplished, and

we accordingly owe to him the invention of several improvements in practical astronomy, the best known being his method of finding the position of the first point of Aries, one of the fundamental points with

reference to which all positions on the celestial sphere are defined. He was the first astronomer to use a clock systematically for the determination of one of the two fundamental quantities (the right ascension) necessary to fix the position of a star, a method which was first suggested and to some extent used by Picard and, as soon as he could get the necessary instruments, he regularly used the telescopic sights of Gascoigne and Auzout instead of making naked-eye observations. Thus while Hevel was the last and most accurate observer of the old school, employing methods not differing essentially from those which had been in use for centuries, Flamsteed belongs to the new school, and his methods differ rather in detail than in principle from those now in vogue for similar work at Greenwich, Paris, or Washington. This adoption of new methods, together with the most scrupulous care in details, rendered Flamsteed's observations considerably more accurate than any made in his time or earlier, the first definite advance afterwards being made by Bradley.

Flamsteed compared favourably with many observers by not merely taking and recording observations, but by performing also the tedious process known as reduction, whereby the results of the observation are put into a form suitable for use by other astronomers; this process is usually performed in modern observatories by assistants, but in Flamsteed's case had to be done almost exclusively by the astronomer himself. From this and other causes he was extremely slow in publishing observations. There was complaints that from Newton that he had difficulty in extracting lunar observations from Flamsteed, and after a time a feeling that the object for which the Observatory had been founded was not being fulfilled became pretty general among astronomers. Flamsteed always suffered from bad health as well as from the pecuniary and other difficulties which have been referred to; moreover he was much more anxious that his observations should be kept back till they were as accurate as possible, than that they should be published in a less perfect form and used for the researches which he once called " Mr. Newton's crotchets "; consequently he took remonstrance's about the delay in the publication of his observations in bad part. Some painful quarrels occurred between Flamsteed on the one hand and Newton and Halley on the other. The last straw was the unauthorised publication in 1712, under the editorship of Halley, of a volume of Flamsteed's observations, a proceeding to which Flamsteed not unnaturally replied by calling Halley a "malicious thief." Three years later he succeeded in getting hold of all the unsold copies and in destroying them, but fortunately he was also stimulated to prepare for publication an authentic edition. The Historia Coelestis Britannica, as he called the book, contained an immense series of observations made both before and during his career at Greenwich, but the most important and permanently valuable part was a catalogue of the places of nearly 3,000 stars.

Flamsteed himself only lived just long enough to finish the second of the three volumes; the third was edited by his assistants Abraham Sharp and Joseph Crosthwait; and the whole was published in 1725. Four years later still appeared his valuable Star-Atlas, which long remained in common use. The catalogue was not only three times as extensive as Tycho's, which it virtually succeeded, but was also very much more accurate. It has been estimated t that, whereas Tycho's determinations of the positions of the stars were on the average about 1' in error, the corresponding errors in Flamsteed's case were about 10". This quantity is the apparent diameter of a shilling seen from a distance of about 500 yards; so that if two marks were made at opposite points on the edge of the coin, and it were placed at a distance of 500 yards, the two marks might be taken to represent the true direction of an average star and its direction as given in Flamsteed's catalogue. In some cases of course the error might be much greater and in others considerably less.

Flamsteed contributed to astronomy no ideas of first-rate importance; he had not the ingenuity of Picard and of

Roemer in devising instrumental improvements, and he took little interest in the theoretical work of Newton but by unflagging industry and scrupulous care he succeeded in bequeathing to his successors an immense treasure of observations, executed with all the accuracy that his instrumental means permitted.



The 20 km wide crater Flamsteed is on the Moon.
The American probe "Surveyor 1" landed some 40km North of here

A Short History of Astronomy,
Arthur Berry, M.A.,
Published 1899

Diary

Date	Time	Location	Subject / Event	
Thu Aug 2nd	**19:45**	**Club Room**	**TED Talk Video**	
Wed Aug 8th	**20:00**	**Club Room**	**Executive Committee Meeting**	
Thu Aug 9th	**19:45**	**Club Room**	**Picturing the Planets**	*Dr Susan cartwright*
Thu Aug 16th	**19:45**	**Club Room**	**Latest Updates in Astronomy**	*Swirthan Manoharen*
Sat Aug 18th	**07:00**		**Society Visit to Oxford**	
Thu Aug 23rd	**19:45**	**Club Room**	**TBA**	*Barry Jackson*
Thu Aug 30th	**19:45**	**Club Room**	**Autumn Sky**	*Andy Kirton-Vaughan*
Thu Sept 6th	**19:45**	**Club Room**	**TBA**	*Andy Kirton-Vaughan*
Wed Sept 12th	**20:00**	**Club Room**	**Executive Committee Meeting**	
Thu Sept 13th	**19:45**	**Club Room**	**TBA**	
Thu Sept 20th	**19:45**	**Club Room**	**TBA**	*Mick Nicholls*
Thu Sept 27th	**19:45**	**Club Room**	**Mars Part 1**	*Paul Money*

(Details correct to time of publication)

TBA – To be announced – (otherwise – We don't know!)

Web site: http://msas.org.uk
Meeting room is at Swinton Working Men's Club, Station Street, Swinton, South Yorkshire, S64 8AU.
Observatory is at Lee Brook Lane, Hoober, S62 7SH
Mexborough & Swinton Astronomical Society is Registered Charity N° 1064103 in England & Wales

For submissions to The Messenger - Editor: Roy Gunson: royg@gmx.co.uk

Metonic Cycle

Meton of Athens was a Greek mathematician who lived in Athens in the 5th century BC. He is best known for calculations involving the eponymous 19-year Metonic cycle which he introduced in 432 BC into the lunisolar Attic calendar. The foundations of Meton's observatory in Athens are still visible just behind the podium of the Pnyx, the ancient parliament. Meton found the dates of equinoxes and solstices by observing sunrise from his observatory.
As a lunar month consists of approximately 29½ days, twelve months will contain approximately 354 days, and as this is 11½ days short of the year, considerable difficulty was experienced in harmonizing a system of chronology depending on the Moon with one depending on the Sun. Meton, who lived between 400 and 500 B.C., discovered (if, indeed, the discovery is not older) that in 6940 days there are almost exactly 19 years, and also 235 lunar months.
Consequently, if the dates of new and full Moon are known for 19 years, the same dates will serve for the next 19 years, and so on. A little complication arises in practice from the way leap years happen to fall; but this cycle discovered by Meton is still the basis by which Christian countries fix the festival of Easter.
As showing the accuracy attained by Meton in the measure of the length of a month, it may be noted that modern observations show that 235 months is about 7½ hours less than 6940 days, or that Meton's rule makes the month only two minutes too short.