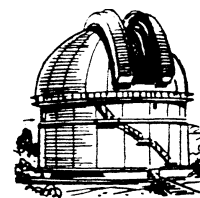

Journal

of the

Nottingham Astronomical Society

July-August 2020



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Thursday, July 2nd

8pm: ONLINE

This evening we welcome

Dr Richard McKim



Director of the BAA Mars Section
who will be speaking on

“Mars in 2020”

Our July “Gotham” meeting will be broadcast live online

The live stream meeting will start at 8pm. The stream can be accessed from 7:30pm onwards. Members will be emailed a link an hour before the meeting is due to begin.

Alternatively the live stream can be viewed directly on our website at <https://nottinghamastro.org.uk/> from 7:30pm.

If you are a registered user of YouTube you will be able to ask questions during the live broadcast via the YouTube live chat, alternatively send your questions live via our social media:

Facebook <https://www.facebook.com/nas.org.uk>

Twitter [www.twitter.com/nottinghamastro](https://twitter.com/nottinghamastro)

email: membership@nottinghamastro.org.uk

We would especially welcome live interaction during the event to keep the meeting as interactive as possible for members, and make it like our normal face-to-face gatherings. Please encourage your family and friends to watch by forwarding them the link.

A Message from the Chairman

Hello all, hope you are keeping well and not driven too mad by the restrictions. Now things are easing it's tempting to feel it's all over, but the bug is still out there, it just needs us to drop our guard!

Our virtual meetings continue apace, I really enjoyed Ian Morison's talk, he reminded me of my trips to the south and the wonderful sights in the sky. Don't forget though that you can get a good 'taste of the south' from places like Greece, southern Portugal and the Canary Islands, where the centre of the galaxy, Sagittarius and Scorpius can be seen in their full glory.

Community Halls can open from 4th July, though we don't know yet what the limitations will be. Our July meeting on the 2nd will be on-line again, with a talk on Mars by Dr Richard McKim, BAA Mars Section Director. James will be continuing the astrophotography theme at our on-line 'Plumtree' meeting on July 16th. If anyone would like to contribute material on AP, they are welcome, please contact James or Richard.

August is normally our BBQ month, but we have decided to stay cautious and substitute an on-line talk about the 'Great Debate' of the 1920s on the size of the universe, by Dr Nick Hewitt of the BAA.

That will bring us to September, by which time (I hope!) we will have a better idea of which way this pandemic and its effects are going. I will be contacting the planned speakers for September and October to see whether they can do on-line talks, just in case. National planning at the moment is like driving a car with a 2 week delay on the steering wheel!

Thanks as always go to Richard, Leigh and James for their tireless efforts to keep our on-line programme going - thanks chaps!

Hope you all have a good summer. All the best – take care.

John

The Nottingham Astronomical Society: E - SERVICES

Whether or not you are a NAS member, you can keep up to date with details of the Society's meetings and other events by visiting the NAS website:
www.nottinghamastro.org.uk

NAS on Facebook

You are welcome to connect with other members and friends of the NAS on Facebook by going to: <http://www.facebook.com/nas.org.uk>

NAS on Twitter

The Society has a Twitter account at <https://twitter.com/NottinghamAstro>

NAS Journal e-mailing list

To register for your monthly e-mailed link to the NAS Journal, and a copy of our SkyNotes, just e-mail secretary@nottinghamastro.org.uk

You don't have to be a Society member to take advantage of this service.

If you happen to change your email address, please remember to inform the Society by emailing us at treasurer@nottinghamastro.org.uk

Sky Notes

July & August 2020



Compiled by Roy Gretton

All times given below are in British Summer Time

Earth will be at **aphelion** on July 4th, when the centre of the Sun will be 152,095,300 km (94,507,640 miles) from us, meaning that we will be 3.4 percent further away than we were on January 5th.

PHASES OF THE MOON

<i>Phase</i>	<i>July</i>	<i>August</i>
Full Moon	5 th	3 rd
Last Quarter	12 th	11 th
New Moon	20 th	19 th
First Quarter	27 th	25 th

In July the Moon is closest to Earth on the 25th, and furthest on the 12th. In August the corresponding dates are the 21st and the 9th.

THE PLANETS

Mercury begins July at inferior conjunction (between Earth and the Sun), thereafter becoming a morning object, reaching greatest western elongation on July 22nd, when it will be 20 degrees from the Sun, but at our latitude less than 10 degrees above the eastern horizon. It then moves back toward the Sun, arriving at superior conjunction on August 17th, thereafter moving into the evening sky. Overall, Mercury should be regarded as unobservable for the whole of August.

Venus will be a spectacular addition to the morning sky throughout the whole of July and August, with greatest western elongation (46 degrees) occurring on August 13th, when the planet will be seen among the stars of Gemini. It will be at magnitude -4.2 or brighter for the entire period, and well north of the celestial equator, so well placed for observers at our latitude.



Looking east at
4:30am on
August 20th

Mars begins July in the constellation of Aries, where it will remain for the rest of 2020, other than a brief incursion into Cetus in mid-July. The scene is already being set for a spectacular opposition in early October. Mars rises before 1am at the beginning of July, and will be rising before 10pm by the close of August. During this period its apparent diameter increases from 11 arcseconds to 19 arcseconds, so telescopic observation should become increasingly rewarding.

Jupiter reaches opposition to the Sun on July 14th, at a distance from Earth of 385 million miles, when it will be shining at magnitude -2.7 , while its equatorial diameter will be 47.6 arcseconds. Unfortunately for UK observers it will be 22 degrees south of the celestial equator, in the constellation of Sagittarius, so at best only about 15 degrees above our southern horizon.



**Looking south
at midnight
(BST) on
July 14th**

*The night of the
opposition of
Jupiter*

Saturn, considerably dimmer than Jupiter, will lie a few degrees to the east in the constellation of Capricornus. It reaches opposition just six days after Jupiter does, at which time Saturn will be at its brightest during 2020, reaching magnitude $+0.1$, with the ring system just shy of 42 arcseconds across.

Uranus, in the constellation of Aries, is a magnitude 5.8 morning object, rising about midnight in early August.

Neptune is a magnitude 7.9 object in the constellation of Aquarius, rising about 10pm at the beginning of August.

METEORS

Early August can be thought of as the start of a new observing season, as true darkness returns to UK skies, and the Perseids make their welcome appearance. This year conditions for observing these meteors are far from ideal (unlike last year) but could be worse. Maximum activity is expected on the night of August 12th-13th, when shortly after midnight a thick but waning crescent Moon will loom over our horizon. The Perseids are debris left behind by Comet Swift-Tuttle, which orbits the Sun every 133 years. Some of them can be very bright and leave trails visible for a second or two.

NOCTILUCENT CLOUDS

Refer to last month's Skynotes for details of these, and see below for members' images of the display of 21st June this year.

DIARY DATES 2020

Monthly Meetings of the Nottingham Astronomical Society

**There will be no meetings at
Gotham or Plumtree until further notice**

*We nevertheless continue to display our pre-arranged programme of speakers
in the hope that it may be possible to livestream some of these talks.*

***Members of the Society will receive further updates
each month from the Chairman***

<u>Date</u>	<u>Topic</u>	<u>Speaker</u>
July 2nd	Mars in 2020	Dr Richard McKim Director, BAA Mars Section
August 6th	The Centenary of the Great Debate How Harlow Shapley and Heber Curtis argued the size of the Universe	Dr Nick Hewitt BAA Trustee
September 3rd	The Plumes of Enceladus	Dr Chris Arridge Reader, University of Lancaster
October 1st	FIAT LUX 3 - The LSST Jedi The Large Synoptic Survey Telescope, the greatest survey yet	Dr Steve Barrett Senior Research Fellow, University of Liverpool
November 5th	Annual General Meeting followed by a Wine and Cheese Buffet	
December 3rd	The Vikings at Barsom - Part 1 Orbital Operations	Paul Money

**The next two Plumtree meetings will be live online on
July 16th and August 20th (see below)**

A Five-Day-Old Moon



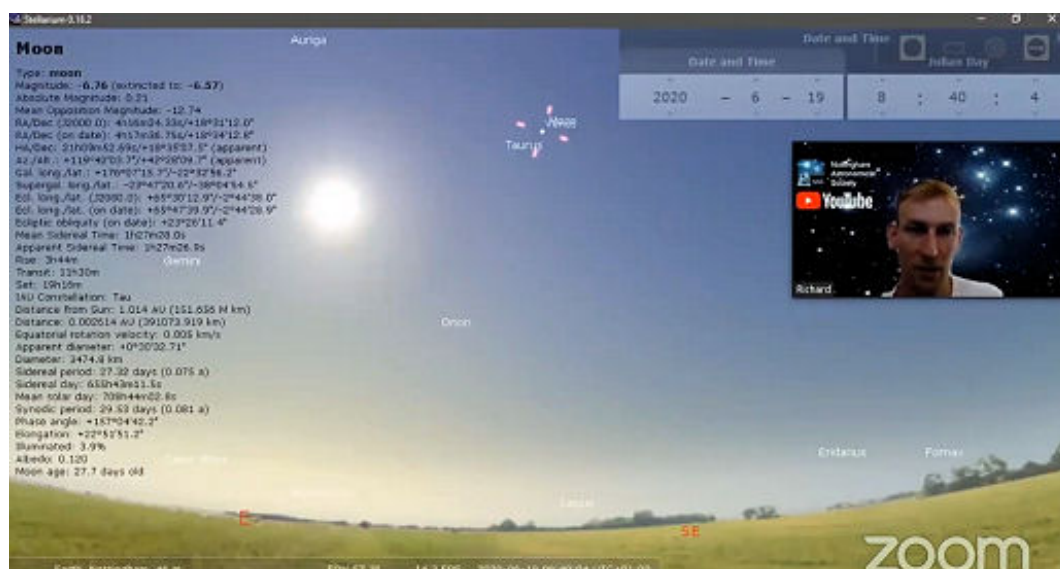
Imaged by the Editor using a Canon 450D camera at the prime focus of
a 30-cm Newtonian reflector

Social and Practical Astronomy, Plumtree, June 2020

The online June Plumtree Meeting covered The Foundations of Astrophotography. We get asked lots of questions about astrophotography and we thought it would be useful to pull some ideas together and get these recorded and to make a resource online for everyone to access should they wish. This talk covered some of the basics, including ways to capture images of the sky with or without a telescope, and outlined some of the commoner objects amateur astronomers observe and image. A brief discussion on mounts and on cameras will hopefully be sufficient to get people new to astrophotography on the right track.

We plan to put together some other online sessions on the following aspects of astrophotography: planetary and lunar imaging; imaging and processing deep sky objects. We don't yet have a time frame for these, but if there are specific aspects of these topics, or others which you would want us to cover, please do let us know.

Richard closed the formal part of the talk with a description of occultation of Venus by the Moon which was to happen the following day (19th June 2020), a report of which is also included in this edition of the Journal.



There were a few **questions** raised on the live chat, which I've attempted to summarise here with some links and comments, in addition to the comments Leigh and I gave on the night.

Mirrorless cameras vs DSLR

Leigh commented on the fact these cameras are often much lighter than conventional DSLR cameras and the absence of a mirror will reduce vibrations, which are often problematic in astrophotography. James wondered if battery life would be an issue as there is no optical view finder, only an LCD one, but turning off the LCD when not in use would likely reduce battery consumption. I've just seen that Canon have a full frame mirrorless camera with an IR-cut filter to allow through more hydrogen alpha wavelength photons (656nm). The [Canon EOS R](#) seems very good for astrophotography, but at over £2000 one would have to seriously weigh up the benefits of this over a dedicated cooled astrophotography camera.

Filters for lunar and planetary photography

If using a colour camera, there is often no need to use filters for the planets as you want to capture as much light as possible; one exception would be to use an IR-cutting filter as if the camera is sensitive to IR wavelengths then this can result in apparent softening of the image

as the IR wavelengths come to focus in a slightly different position to the wavelengths in the optical part of the spectrum; this can make the image look out of focus. With the Moon, a neutral density filter can be used to decrease the glare of a full Moon or phase near full, and may help to increase contrast at these phases; a cheap Moon-filter works in a very similar way, but James doesn't use filters when imaging the Moon with a standard colour camera. If using a dedicated planetary camera or a mono camera, then all sorts of filters can be employed. We will aim to cover filters in the one of the future Social and Practical Astronomy meetings. This [page](#) has some useful information on filters.

Taking astrophotographs with binoculars

Leigh had attempted this and reported it was difficult, but possible. If you only have binoculars and are keen to try, then certainly give it a go and let us know. There is an [interesting article](#) here on the topic.

Why more green pixels in a Bayer Matrix than red or blue

Leigh explained that the Bayer Matrix on a colour camera is designed to more closely match the properties of the human eye, which is more sensitive to green light than to red or blue. This [Wikipedia article](#) discusses the Bayer Matrix.

RAW vs JPEG file types

JPEG images are compressed and a significant amount of "data" is lost in generating a JPEG file, to make the file size manageable. RAW files preserve all of the original data, and are subsequently much bigger files, but allow the image to be manipulated to a greater extent in the editing phase, with the ultimate goal of nicer, clearer, more detailed images. This [Sky at Night article](#) covers this topic well, and another on the [Nikon website](#) goes into more detail on the topic.

Second hand astronomy equipment

[AstroBuySell UK](#) is a great online resource for selling and buying second hand astronomy kit. I am unsure of what protection the website offers buyers or sellers, but I have used this on numerous occasions without issue.

How do I convert FITS files

Use some free software called [FITS Liberator](#)

The whole session is available on the Nottingham Astronomical Society's YouTube channel, and can be accessed here:

<https://www.youtube.com/channel/UC5L-iPfcFqFHO8KLOO9-AA>

James Dawson, NAS Helpdesk & Plumtree Meetings

helpdesk@nottinghamastro.org.uk

Forthcoming online Plumtree Meetings

For the **July Plumtree Meeting (Thursday 16th July)** we will be broadcasting the talk Alan Heath gave in 2019 at Nottingham Trent University on a *Lifetime of Astronomical Observations*. Alan first joined Nottingham Astronomical Society in 1952 and was elected president in 1958. Alan was also the British Astronomical Association's Saturn Section Director from 1964 until 1994 and Alan continues to observe today. This talk was hosted by [Dr Dan Brown](#) of [Nottingham Trent University](#) and supported by the [Institute of Physics](#). Dan has kindly allowed us to share the recording he made of Alan's talk. We hope to get Alan on the telephone after the broadcast to answer live any questions members may have for him.

[below: Alan with Patrick Moore in 1996 at the Palomar Observatory, California, USA]



The **August** Plumtree Meeting (**Thursday 20th August**) will be a talk by the British Astronomical Association's [Deep Sky Section](#) Director, Callum Potter. The Deep Sky Section encourages observation of star clusters, nebulae, galaxies and double stars. Callum will talk on Observing the Deep Sky, and hopefully give us some tips on how best to see and image some of the objects which are outside of our own solar system. I'm really looking forward to this talk! *[below: Callum Potter]*



Zoom

Julian had said he thought it would be good if there was an online meeting after the talk for members to informally chat and catch up. Julian set up this meeting on Zoom and shared the login details.

Once the formal meeting had finished, half a dozen people logged into the Zoom meeting, and chatted about a number to topics and caught up.

One thing Fred shared was a website on Space Weather: <https://www.spaceweather.com/>

Occultation of Venus by the Moon, 19th June 2020

As Richard described in the meeting, the planet Venus was going to be hidden from us by the Moon on 19th June 2020, a so-called occultation; the whole event was to last about an hour, but occur in broad day light commencing at 08:40am, only 20 degrees away from the Sun.

The occultation of planets by the Moon not only depends on the alignment of the planet in question, but also of the Moon and the Earth, and specifically where the event is observed from on the Earth. The last time Venus was occulted by the Moon as viewed from the UK, was 6th April 2016, and the next time is 9th November 2023. Consequently, these events are relatively uncommon and the challenge of observing them or imaging them appeals to many amateur astronomers. In the past, such occultation events were used to help study the potential atmosphere of the Moon, observe the lunar terrain at the very limb of our nearest natural satellite, and also to help refine the orbital predictions we had of the Moon and the planets and their satellites.

Richard and I were keen to observe the event and try and capture the exact time Venus made contact with the Moon and also when it emerged from behind the Moon about an hour later. We'd decided in advance what telescopes we would use, and what camera, and that we'd be able to observe the whole event from either of our gardens. In the days leading up to the 19th June the weather forecast worsened as a low pressure system pushed over the UK, bringing significant rainfall and cloud. The evening before the occultation the forecast for 9am the next day suggested the whole country would be under cloud. We made a plan to re-assess the situation at 4:30am giving us the option to travel elsewhere in an attempt to find a location free from cloud.

Drawing on Richard's meteorological training, it looked as though the only places in the UK which were likely to have clear patches were the north Norfolk coast, and the Lincolnshire coast. The former looked to be a better bet, so we set off, heading for Cromer.

The weather conditions changed dramatically en route; clear blue sky, heavy rain, dense grey clouds... By the time we got to Holt in north Norfolk it was already 7:40am and we decided we needed to urgently find a location to start setting up. We headed for the nearest beach, which happened to be Weybourne Beach, a couple of miles west of Sheringham and not far from Kelling which hosts star parties throughout the year.

A large, mostly empty car park with a shingle surface greeted us with a substantial bank of pebbles protecting us from the sea just 50m away. By now it was 7:55am and the occultation was to begin at 8:43am and we had two mounts and telescopes to set up and align with only small, intermittent patches of blue amid the cloud. Both of us have Skywatcher AZEQ6 mounts, and I'd taken a Celestron 11" SCT and Richard a Skywatcher ED80, 80mm apochromatic refractor.

We aligned our equatorial mounts in the rough direction of magnetic north using a compass, and hoped that there was minimal difference in latitude between our current location and Nottingham. We hoped the the RA axes now approximately aligned to the polar axis and this would give us a very rough and ready polar alignment – it was bright daylight so there was no chance of seeing Polaris or any other stars other than our own Sun. With polar alignment achieved, we pretended to undertake a one star alignment on Vega to activate GOTO, though we couldn't actually see this star.

We started hunting for Venus, which we knew would be brighter than the very thin 3.7% illuminated crescent of the Moon. The GOTO of the mount pointed too near to the Sun and our planetarium software suggested we needed to be about 20 degrees away from the Sun

and a little higher in altitude. We took turns in making sure neither of us were sweeping anywhere near the Sun. Use of any optical device near the Sun can be very dangerous, so care must always be taken.

It was now 8:35am and we'd still not found Venus or the Moon and the cloud was thickening up, as was the wind. The conditions worsened and the time of first contact came and went behind a dense blanket of cloud. We'd travelled all this way and missed it – we felt pretty deflated.

Several people came up to us to ask what we were doing. It was nice to explain about the occultation and reminded us of how rewarding outreach events can be. I kept a close eye on one dog that really enjoyed sniffing the legs of my tripod...

There were several small breaks in the cloud whilst Venus was hidden behind the Moon and we tried again sweeping to find the Moon, in the hope we could at least see the re-appearance of Venus. Every wisp of cloud looked like the thin crescent we were searching for; it was an impossible task. Weather conditions worsened again and we missed the emergence of Venus from behind the Moon. A double blow!

Soon after 9:50am the clouds cleared somewhat and we decided it would be nice to at least find Venus.

Richard had brought along a white light solar filter for the ED80 and had the idea if we could align the scope on the Sun, we could then maybe use the handset of the mount to find Venus. Richard aligned the telescope on the Sun and could see the bright featureless disc of our nearest star. Despite the handset not having the Sun as a target for alignment purposes, we used the Pointing Accuracy Enhancement (PAE) function of the handset to update the GOTO with the exact position of the Sun, and hoped this would refine the position of the Moon and Venus... No luck, it was just as bad as our first GOTO attempt. We then wondered if we could use the setting circles; aligning the telescope again on the Sun, I adjusted the setting circles to the known RA and Dec of the Sun given by the planetarium software. We then moved the scope to the RA and Dec of where Venus should be using the setting circles. Richard started a more focussed search and within moments said "I've got it".

We both had a look at Venus through the 40mm eyepiece (15x magnification) between the clouds. The thin, 7.9% illuminated crescent of Venus was easily seen and remarkably bright (magnitude -4.43) against the blue background sky. There was no sign of the Moon.

The cloud was back. We decided to wait for a clear patch and put the camera at prime focus and take some images of Venus to prove we had actually seen it. When a gap appeared in the clouds a few minutes later, we marvelled that the planet was still in the centre of the field of view, so the polar alignment hadn't been so bad after all. The Canon 6D was attached with a 2" nosepiece, and focussed as best as possible given the cloud and turbulent seeing conditions. It started to rain before we managed to take any pictures so we threw covers over the telescopes and took cover ourselves. The shower lasted just 10 minutes, and we uncovered the telescopes and waited again for a break in the cloud. Through the smallest possible gaps in the cloud, we took a series of images at different shutter speeds planning to review what we had later, pushing Venus to the edge of the frame in the vain hope of also capturing the Moon. The weather was worsening and it was now nearly an hour after Venus had emerged from behind the Moon. We decided to call it a day. I packed up my Celestron C11 which has been unused since the original sweeping exercise at 8am, and Richard packed up the ED80.

We couldn't have travelled to the seaside and not seen the sea, so we went for a stroll along the beach and were astounded at how soft the silts and clays were which made up the cliffs; a continuous horizontal streak of flint lay some 20 feet from the top of the cliff which has presumably been deposited by a glacial event.

We stopped off for fish and chips on the way back to Nottingham, and despite not observing the occultation itself, we were content with having found and observed Venus.

When back in Nottingham that evening Richard was looking at the images we had taken, and again said “I’ve got it”. This came as no surprise as I knew Venus had been in focus on the camera. “No, I’ve got it; I’ve got Venus AND the Moon!”

A number of the images we had captured show the very thin crescent of the Moon and the much brighter, but vastly smaller crescent of Venus. Most of the images are rudely interrupted by cloud, but one, below, has minimal intrusion by cloud and if you look carefully shows both crescents, and was captured 36 minutes after emergence. A perfect ending to an exhausting, but very special day.

James Dawson & Richard Severn



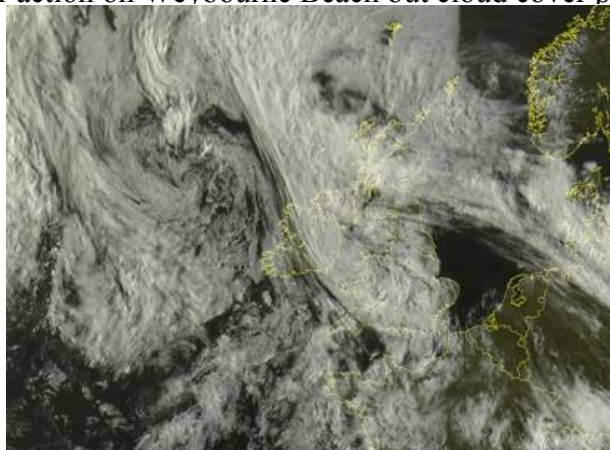
Map showing location of Weybourne Beach, north Norfolk (©Google Maps)



Satellite image of Weybourne Beach, north Norfolk (©Google Maps)



Ready for action on Weybourne Beach but cloud cover preventing play



Cloud cover over the UK during the occultation (© www.sat24.com)



Venus (top right) and the very thin crescent Moon (just below and left of centre)



Panorama of Weybourne Beach, centre of image looking NNE



Layer of flint amongst the soft silts of the cliff face, with recent cliff collapse in distance

Venus - Pleiades Conjunctions (1980-2020)

In last month's article I mentioned that every eight years Venus makes a close conjunction with the Pleiades open cluster, without giving an explanation as to why this happens. That reason is as follows.

The orbital periods (sidereal periods) around the Sun for the planets Venus and Earth are in a close orbital resonance of 13:8 such that for every 13 orbits Venus makes around the Sun the Earth will make 8. Therefore, for Venus $13 \times 224.697 = 2921.061$ days and for Earth $8 \times 365.253 = 2922.024$ days.

A consequence of this is that every 8 years Venus will be in the same part of the sky relative to the stars. The star background will not be exactly the same every 8 years because the resonance is not precise, neither planet has a perfectly circular orbit and the orbit of Venus is slightly inclined to the ecliptic (Earth's orbit).

Around the end of March/start of April every 8 years Venus makes a close conjunction with the Pleiades open cluster in the evening sky. Also, by chance, Venus is near to greatest elongation east meaning the event can be seen in a relatively dark sky. The last such event has just taken place this year.

Although I did not intentionally set out to observe these conjunctions every 8 years, that is what has happened. The last conjunction was my sixth, making my first observation back in 1980. I have also managed to image all of these six conjunctions with the same lens.

The results are shown in the two attached figures in the form of a composite image (Fig 1 has not been annotated, whereas Fig 1a has been annotated to bring some order to the apparent jumble of multiple images of Venus). The images show the position of Venus for a few days either side of the conjunction date with the Pleiades, for the conjunctions in 1980, 1988, 1996, 2004, 2012 and 2020.

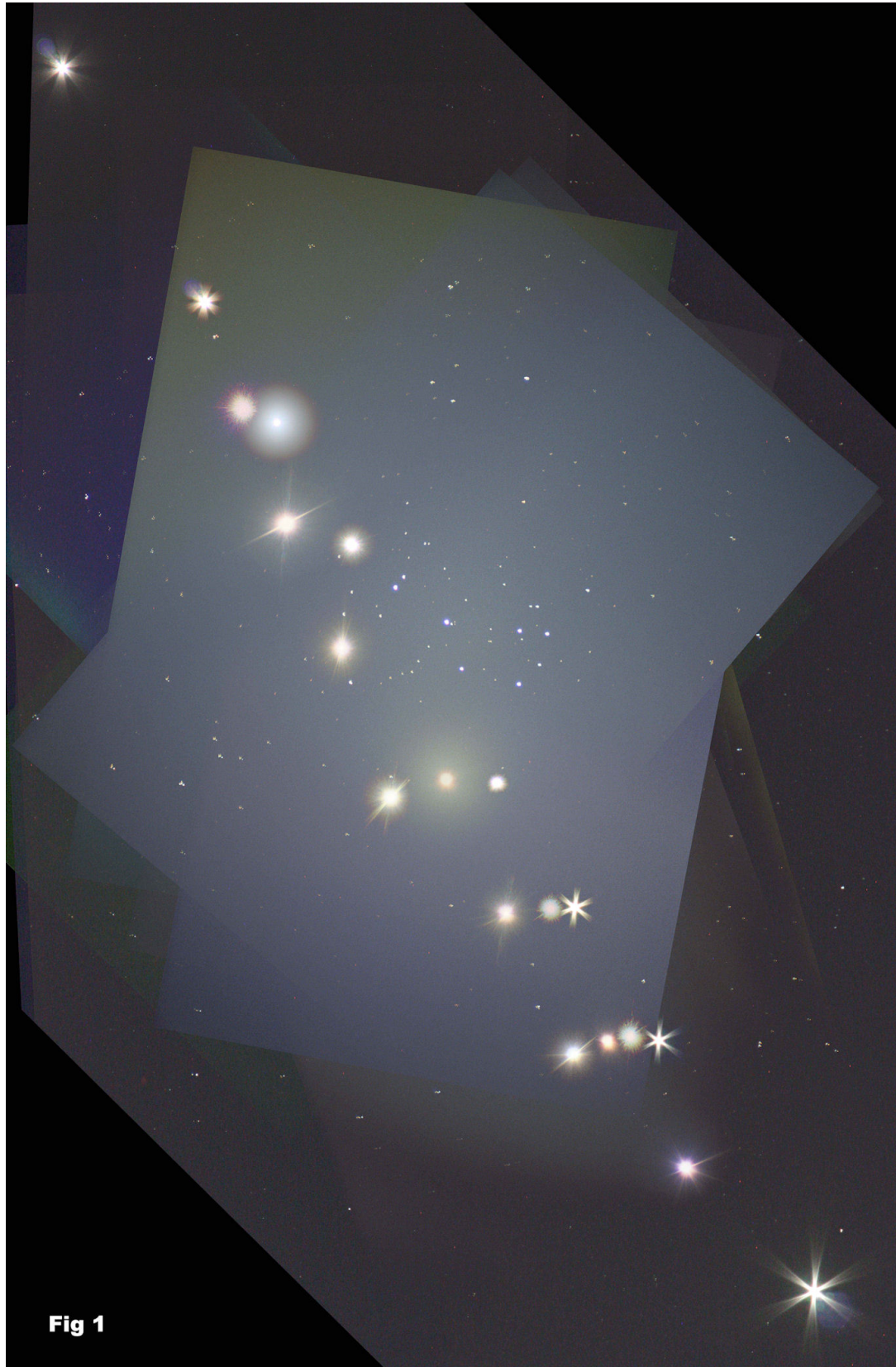
The images were taken with a camera mounted on the end of the declination axis of the same 254mm f/5 Newtonian reflector. The 1980 to 2012, inclusive, images were taken with a SLR Praktica LTL camera using Ektachrome 200, Elite II and Elite Chrome film (all ISO 200) and the 2020 images with a DSLR Canon 450D camera (at ISO 1600).

For the images taken in 1980 to 2012, inclusive, the lens used was a modified 60mm f/7 refractor (thus yielding a focal length of 420mm). Optically the lens is poor as can be seen from the quality of the stellar images.

For the 2020 conjunction because the sensor in the Canon 450D is half the size of the 35mm film format I had to resort to a number of different lens combinations depending on the Venus - Pleiades separation. This included the same lens as mentioned in the previous paragraph as well as a 135mm lens (set at f/4) with a x2 converter, thereby giving an equivalent focal length of 270mm at f/8, and the 135mm lens (set at f/8) on its own. The 135mm lens was the Pentacon lens I used to use with the SLR Praktica camera. This lens has a fixed infinity stop but requires a special adapter (suitably purchased many years ago) to couple the M42x1mm thread of the lens to the bayonet fitting of the EOS Canon body. This adapter is specifically manufactured to ensure that the image will be in focus when the lens is set to infinity. Different DSLR camera bodies require a different adapter (also made by the same manufacturer).

The annotated image shows that, for any particular day, Venus is amongst the same group of stars for each of the different conjunction passages. However, what is noticeable is that at every conjunction Venus has been getting steadily closer to the Pleiades at the time of minimum separation (around April 3).

I used a planetarium software program to show where Venus would have been on every day for the period shown in the figures to reveal more about the position of Venus on each of the days during the six conjunctions. This revealed that on March 28 Venus' position resembled a 'chevron-shaped' curve over the six conjunctions, whereas on April 8 it was more a 'sabre-shaped' curve. I think this is probably due to the fact that greatest elongation east has moved from April 5 in 1980 to March 24 in 2020.



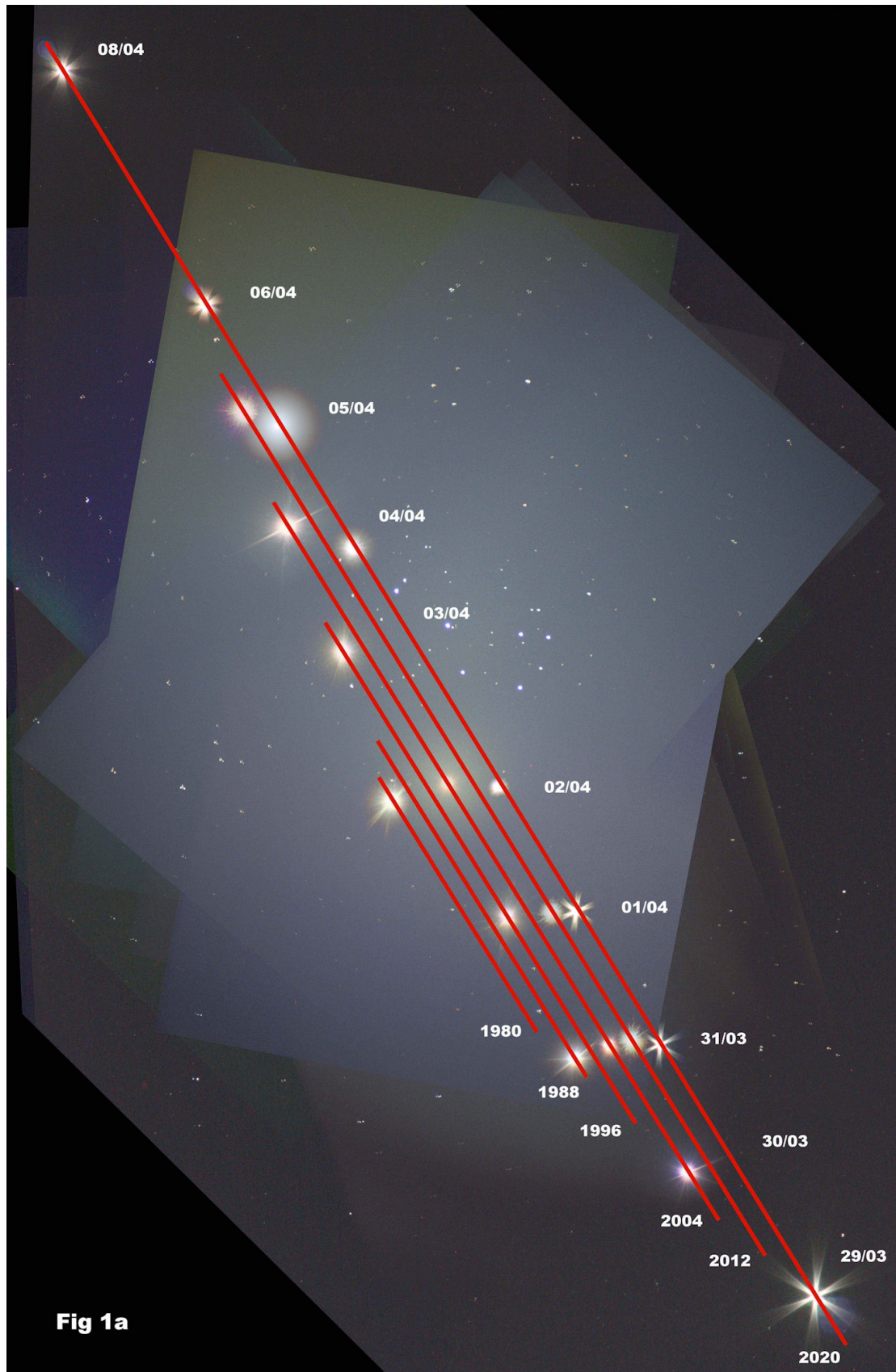


Image details on the various dates are as follows:

1980 April 2	420mm lens Ektachrome 200	20h 11m UT	5min exposure
1988 March 31	420mm lens Ektachrome 200	20h 13m UT	5min exposure
1996 April 1	420mm lens Ektachrome 200	19h 56m UT	5min exposure
1996 April 3	420mm lens Ektachrome 200	20h 05m UT	5min exposure
2004 March 30	420mm lens Ektachrome II Elite	20h 20m UT	4min exposure
2004 March 31	420mm lens Ektachrome II Elite	19h 39m UT	3min exposure
2004 April 2	420mm lens Ektachrome II Elite	19h 42m UT	5min exposure
2004 April 4	420mm lens Ektachrome II Elite	20h 00m UT	5min exposure
2012 March 31	420mm lens Ektachrome Elite Chrome	20h 02m UT	5min exposure
2012 April 1	420mm lens Ektachrome Elite Chrome	20h 04m UT	5min exposure
2012 April 5	420mm lens Ektachrome Elite Chrome	20h 01m UT	5min exposure
2020 March 29	135mm lens, f/8	20h 30m UT	20sec exposure Digital
2020 March 31	135mm lens, f/8	19h 49m UT	4sec exposure Digital
2020 April 1	135mm lens, f/8	21h 31m UT	10sec exposure Digital
2020 April 2	420mm lens	21h 45m UT	10sec exposure Digital
2020 April 4	420mm lens	20h 16m UT	10sec exposure Digital
2020 April 5	420mm lens	20h 37m UT	4sec exposure Digital
2020 April 6	270mm lens, f/8 (equiv)	20h 40m UT	10sec exposure Digital
2020 April 8	270mm lens, f/8, (equiv)	20h 32m UT	10sec exposure Digital

PhotoShop was used to generate the composite images, where each film image was rotated to register the star images. All of my film images were digitised many years ago. For the digital images both rotation and scaling was required. There is some degree of mismatch in the stellar images that I have been unable to remove. I suspect this may be due to lens distortion (barrel or pincushion) which PhotoShop cannot remove. I have not removed ‘hot’ pixels or those leaving red or blue pixels. So the images are shown ‘warts and all’. The final image was very time-consuming (is there a better way?).

The images have been orientated to depict a view with the horizon horizontal at around 20h 00m UT. My notebooks at the time show that on some of the dates the Moon was in close proximity to the conjunction and just out of the field of view or that a bright Moon was in the sky at the time of the exposure. In addition, some exposures were taken when there was high thin cloud (or worse) present, hence the rather bloated images for Venus.

In all the exposures the telescope was driven in RA and, particularly for those taken on film, the telescope was guided (by hand, remember those days!!!) because of the length of the exposure. No guiding was performed for the digital images, as the exposures were much shorter. My telescope has a sizeable periodic error in the RA drive of 4min duration (the rotational period of the RA worm).

On a personal note, from my location in Nottingham, on the evening of the tightest grouping (April 3) there was only one image (in 1996) when the sky was clear out of the possible six.

Brian Griffin

Noctilucent Clouds 2020

There were displays of these visible from Nottinghamshire in late June. Five NAS members have sent in their images from the night of June 21st-22nd.



Brian Carrington, Langar



Leigh Blake, Stragglethorpe (taken on Samsung S10 phone)



John Hurst, East Leake, Nikon D700, 50mm f1.8 lens



Richard Severn, Canon 6D, 1/30th sec at ISO 12800



Richard Severn, Canon 6D, 1/5th sec at ISO 3200



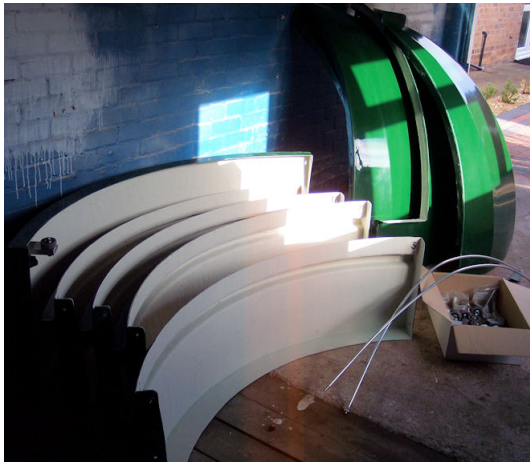
Gareth Davies, Canon 700D, 20sec at ISO 100

Advertisements

FOR SALE

Pulsar 2.1-metre Observatory Dome and Track in Racing Green

Made by the leading UK manufacturer of GRP observatory domes.
The dome and the track are each fabricated in four segments that bolt together.
The track is intended to be fixed to a flat roof (and could be used for converting a roll-off roof observatory into a domed one).
The complete kit was purchased in 2008.



The dome and track sections as delivered from Pulsar



The track fitted to a flat-roofed shed



The dome mounted on the track

The original price of the dome and track was **£2000**

Suggested price **£500**
but any reasonable offer will be considered

Contact **Roy Gretton** on 07483868162 or journal@nottinghamastro.org.uk

FOR SALE

Celestron CPC Deluxe 9.25 Edge HD Telescope

Almost brand new in perfect condition in original packaging

235mm aperture top-of-the-range instrument, with eyepiece giving magnification of 102x. Computerised Alt-Azimuth Dual Fork Arm Mount, with 16 channels GPS.

The telescope was purchased from The Widescreen Centre who are happy to validate the purchase and details. It was delivered in December 2018 and only used twice before my husband passed away.

In addition to the telescope there is a Celestron Powertank Lithium Pro Battery costing £180 and unused.

Sensible offers accepted in the region of £2200.

Located near to Bingham/Newark, Notts.

Collection only.

Please contact Sally on **07531 253416**



FOR SALE

Equatorial Mount (GEM1)

An opportunity to acquire a very solid telescope mounting, with drive motor, power supply, and finder scope for polar alignment



The mount was purchased second hand but never used, and has been stored in a garage for 8+ years. The owner is an NAS member and will donate any money raised from this sale to Society funds.

We are suggesting a guide price of **£30**, but any reasonable offer will be considered.

Contact Bob Abrahart

r.j.abrahart@gmail.com

Isaac Newton



Isaac Newton was born prematurely on 25th December 1642, (according to the Julian calendar. It wasn't until 1752 that the UK changed to the current Gregorian calendar which had been in use by most European countries since 1585) to Hannah Ayscough, who had been widowed three months previously, and was of 'independent means.' With his late father's estate, a successful livestock farmer, and mother's income Isaac enjoyed a modicum of financial stability.

When Isaac was aged 3 his mother remarried and moved to be with the Reverend Barnabus Smith leaving young Isaac in the care of Margery Ayscough, his maternal grandmother, at Woolsthorpe attending local schools until the age of 12 when he lodged with William Clarke, an apothecarist in Grantham. There he developed an interest in chemistry and attended King's School being largely left to independent studies. Returning to Woolsthorpe at 17 to help his mother run the farm (she had been widowed again with two more children). Isaac soon proved that he was, to say the least, not suited to the routine of agricultural life, preferring to utilise his time and craftsmanship for his own studies.

Unsurprisingly, Newton's mother was soon persuaded by the Master of King's School, Henry Stokes, to return him to Grantham, where this time he attended to his studies sufficiently well to gain entry to Trinity College, Cambridge as a subsizar (a sort of undergraduate bursary where the person is expected to do work for their college in return for part of their education, gradually becoming purely financial in nature) despite his family's wealth.

It is thought that this remarkable academic improvement came from a William Walker, a schoolmaster and rector in Isaac's school days, but there is no documentary evidence of this before 1665.

A great-uncle and good friend of his grandmother, Robert Newton, and his uncle, the Reverend William Ayscough, played key roles in getting him to go to Cambridge where he gained the reputation of being 'strange, solitary & abstemious' but he played cards and entered into a long companionable and convivial friendship with a John Wickens who shared rooms with Isaac for nearly 20 years.

In 1664, having bought a book on astrology, Newton turned to a purchased copy of Euclid's '*Elements*', which was almost mandatory reading for all university students from the late 15th to 20th centuries, to understand trigonometry. It was dismissed by Newton as "just a trifling book". Newton, in order to gain his scholarship, was persuaded to rapidly revise his opinion to be more favourable of the Greek author.

His questioning studies took him wherever he fancied but most of the main contemporary scholars were included. Galileo died about a year before Newton was born so heavily influenced the student with comparatively fresh thoughts along with Rene Descartes ("I think, therefore I am"). Further study of what we would call an academic in today's times led Isaac to lay down the foundations of calculus several years later.

1665 saw the start of the Great Plague so Newton, on gaining his degree, returned to Woolsthorpe for a two-year furlough developing the basis of his theories on calculus, optics and gravity, obviously spending too much time under the apple tree. The farm staff at

Woolsthorpe knew that Cambridge was the best place for him and were glad to see him leave for academia as they were all too aware of his lack of interest in agriculture.



In 1668, having been elected a Fellow of Trinity College the previous year, Newton returned to Cambridge with a reasonable living that afforded him some luxuries – in comparison to Samuel Pepys who had £50 per annum to look after himself and a wife at the time. He submersed his life into firstly gaining his Master of Arts (MA) and in his private studies eschewing a social life, barely fulfilling his teaching commitments to frequently empty classrooms, as he had a bad reputation for communicating with students, but produced excellent papers when necessary.

His boss, Isaac Barrow, arranged for Newton to take over his job as Lucasian Professor of Mathematics in 1670. 1672 saw him elected to the Royal Society at the time of donating a self-built wooden telescope to the Society, of the design that bears his name to this day. His extensive original thinking cut across the established consensus in many areas, which was not exactly popular, though he was courteous in dealing with any objections.

Fellows at Trinity were expected to be of the Anglican faith and fully subscribe to the church's principles (which he did not) but managed to get an exemption which enabled him to remain employed and enjoy being an academic though he did not fully participate in his College and University's social and ceremonial activities.

In a letter denying a charge of plagiarism made by Robert Hooke, the Royal Society's 'Keeper of Experiments' in 1676, Newton made one of his more famous quotes: 'If I have seen further it is by standing on the shoulders of giants,' thereby acknowledging that scientific advancement depends on knowing what has gone before in the light of new knowledge or thinking. The ensuing enmity lasted until Hooke's death in 1703.

At the end of June 1686 Newton finally published his most famous work entitled "*Philosophiae Naturalis Principia Mathematica*" which dealt with mathematical principles, with the help of his supporters in the scientific world.

However *Principia* was not an easy read, being both very mathematical and written in Latin – the universal language of learning. A Cambridge student, passing Newton in the street, said to another 'There goes the man that writt a book that neither he nor any body else understands'.

The book probably was the last major work published in Latin, as was the custom then., However it is fair to say that the language was dying out by the time *Principia* appeared. The unhelpful remark shows that he was not a particularly popular person apart from the people that really mattered to Newton.

It is for you, the reader, to decide whether he understood what he had written but this author's view is, for what it is worth, that he did but was not necessarily able to adequately express his thoughts

in terms understandable to non-academics (who might not have been the intended audience anyway). It seems that the comment has more than a smattering of jealous acknowledgement about it.

Newton's rise in fame and ability to attract patronage from benefactors (no doubt benefiting Trinity College as well) inevitably caused friction with some of the contemporary and better known scientists as he, with a proper factual base, provided alternative answers to the

established understandings that they were promoting. Nonetheless it seems that he was highly capable of smoothing over differences; however the evidence suggests that he did harbour grudges even if he did not act upon them.

During later part of the 17th century Newton's interest in alchemy resurrected itself piquing his desire to find the 'brew' that controlled nature within a group of closet alchemists which included Robert Boyle.

One member of this group, a Swiss mathematician named Nicholas Fatio de Duillier, with whom Newton enjoyed a very close relationship with from 1689 to 1693, (how close it actually was is anybody's guess, but it was close enough for Newton to offer to pay for his medical bills). When this relationship finished in August 1693 Isaac had a breakdown which affected relationships with others in his social circle for a while and, after recovering, moved to London in 1696. A post-mortem examination of his hair showed an abnormally high level of mercury so raising the high probability that he took in more of the metal than was advisable during this period and displayed the behavioural side-effects of mercury poisoning. Newton made the acquaintanceship of John Locke, possibly through being on the outer fringes of 'The Glorious Revolution', a physician by trade some 10 years older than him. Locke was part of the late 17th century 'freethinker' group of intellectuals circulating within government circles who felt that the Cambridge professor was wasting his time out of London. Newton had lost an election in the early 1690s to be Provost of the University due to not being 'of the cloth' (which was mandatory at the time) and was marking time looking for alternative sources of income whilst his academic peers were getting advancement into the higher echelons of the Church. His friend Locke, along with Lord Monmouth and Charles Montagu (later Lord Halifax), meanwhile busied themselves looking for a suitable opening for Newton.

It took till 1696 for Montagu to have sufficient influence (as Chancellor of the Exchequer) to allow Newton's appointment to the Warden of the Royal Mint, which was intended to be a sinecure so Newton had plenty of free time to do his own research. Conversely, he took the role seriously, which predicated his move to London. In the first eighteen months of his appointment Newton had a significant role in the successful prosecution of 28 'coiners' (counterfeiters and shavers – scraping silver off the sides of coins leading to the introduction of coins with milled edges), who were then sent to meet their executioner.

His success at reforming at the Royal Mint soon had him being promoted to Master of the Mint at the end of 1699 with a decent salary along with significant involvement, at the practical level, in monetary policy. He also engaged in various entrepreneurial activities whilst continuing his scientific research and publishing interests.

Whilst Warden of the Royal Mint, Newton was active at Cambridge as Chair of Mathematics until 1701 when he resigned causing his Fellowship with Trinity College. He was one of the representatives in the University Parliament for about 8 months (November 1701 to July 1702) and tried again in 1705 but failed due to his political allegiances. Newton's successor in the Lucasian Professor post, William Whiston, followed him into the Warden's job at the Royal Mint.

Autumn 1703 in London saw the Presidency of The Royal Society become vacant which Newton was elected to fill, a post he held for the next 25 years. One of his first tasks was to help find the finance to publish John Flamseed's manuscript, 'Observations', with the aid of Halley. The first Astronomer Royal (who was notorious for hanging on to his work) was not pleased and acquired 300 of the 400-print run to destroy them, claiming that it was incomplete. The book was republished later with the aid of Flamsteed's wife. Newton obtained the money from Prince George of Denmark, who had recently been elected as a Fellow at the Royal Society and Queen Anne's husband. She was suitably impressed with her husband's recommendation of Newton to knight him privately at Trinity College during a ceremonial visit to Cambridge in 1705.

Newton solved many scientific problems throughout his life which are cited in larger articles on this subject; often despatching the answer quickly – solving one such problem overnight after a day's work at The Mint, six months after it first being offered to other esteemed mathematicians. He also published a companion book, amongst many titles, to his maligned "*Principia*" on optics and several revisions to the former.

Newton lived his final years at Winchester with his niece Caroline Barton-Conduitt and her husband after being relieved of his Royal Mint duties due to ill-health in 1725.

He died during the early hours of March 20th 1727 at the grand age (for the era) of 85 and is interred in Westminster Abbey.



It is a fair bet that Newton's work touches most sectors of life today, four centuries later, with the most notable exception being politics.

Newton retained ownership of Woolsthorpe Manor until it was handed down as an inheritance to a member of his family but the value of it was then squandered on "wine, women and song" with the property being left to fall into serious disrepair by 1800 as depicted in a painting made at the time.

Author's Note: The above, of necessity, does not include Newton's interaction with many of his peers with which he had intellectual and ownership disputes that were essentially about professional and personal egos, therefore doing so would be rather repetitious of the same basic point that he showed great ability to handle people with some skill.

This script is about giving the reader a flavour of the person Newton was, not a blow-by-blow biography.

The fact that he was not married, or that he, as far as it is known, didn't have a significant female partner does not, of itself, necessarily mean that he was homosexual – I personally doubt that many women would have put up with the high level of devotion to his studies, work and outside interests that he exhibited long enough to get the relationship beyond the casual stage, certainly whilst at Cambridge with a moderate and uncertain income barely sufficient for his own immediate needs.

Neil Mudford

The NAS in Soar Valley Life

The Society has a page in a local south Notts/north Leics free magazine, Soar Valley Life, which is normally delivered to households in the region, but during the lockdown is available online only. You can access it by going to

<https://soarvalleylife.co.uk/magazine>

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Supporters of the **Commission for Dark Skies**

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Under normal circumstances our formal meetings, often with an illustrated talk by a guest speaker, are held on the first Thursday of each month (except in August) at:

Gotham Memorial Hall

Gotham

Nottingham NG11 0HE

Doors open 7.00pm

Meetings start 8.00pm

Meetings end 10.00pm

These meetings are open to the public, and visitors are welcome to attend.

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The Nottingham Astronomical Society

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