

Reflections

Journal of the Northern Sydney Astronomical Society Inc.

February 2019

President's Message

Hi everyone.
What a magnificent summer!
It seems ages since the lovely summer days have landed on our holiday period in such a comprehensive way. It has been a great holiday period for me and I hope you have all had such a great time as I have had.

I am equally pleased to see the Reflections magazine has had a resurgence and I encourage everyone to take an interest in it.

We are expanding the source of contributions for the magazine with the inclusion of the Object of the Month and other items of interest to our community. To this end you will see our website move to more of a blog style website with people able to post items of interest directly to it. This will include photos and articles and hence be a source for Reflections.

I'd like to say a big thank you to Ben Petschel for picking up the flagstaff on

Object of the Month as it had been an idea waiting for someone to bring it to life for some time.
This past two months' contributions have been interesting and seen some wonderful images come to life.

It showcases the skills that some of our members have and a big congratulation to Kym Haines, the winner for this month, Phil Angilley and Daniel Patos, the runners-up, for their excellent work.

Kym's M42 photo as seen on page 2 is magnificent and the colours and framing are excellent.
It really makes justice to an iconic image in our night sky

The technicalities in taking Phil's image of the comet last month and the intricacy of the framing and colour processing in Greg McCall's M42 piece are both not to be underestimated.

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The last month's images and videos of Wirtanen 46P comet, along with this month's incredible photo of M42 exemplify the talents that can be found amongst our club members.

A quick shout out to some upcoming events.

In April we will be running our New Astronomers Group (NAG) course and September will see our first star party hosted in the Hunter Valley, which should be a great time mixing "business" and pleasure.

If you have an interest in either of these events please contact us via the addresses on the NSAS Website.

David Stevenson

Who could have predicted it: the entries for the Object of the Month Competition keep coming in!

I'm absolutely flabbergasted by the amount of work and persistence involved in the creation of these pictures.

Not only do you have to stay up all night and maybe two or three but it does not finish there, the post-processing must take at least one full day!

Anyway, I won't comment any further, just have a look at this month's pictures and marvel!

When it comes to articles, it appears it can be just as much work: have a look at the amount of literature Greg consulted to write his article.
(OK, I can hear you, mine did not take that much research)

On the last page you will find something rather unusual these days but something I find extraordinary and that I would like to be able to do: a sketch by Ilya Genkin!
Yes a hand drawing of the night sky and not any night sky but the conjunction of Venus and Jupiter.
Don't miss it, it's absolutely superb.

And finally, an interesting piece of information: Marnie Ogg, winner of the Dark Sky Defender award has put forward a proposal with the National Parks and Wildlife Service and the Northern Beaches Council to create an Urban Night Sky Park on Barrenjoey Head.

Marnie Ogg, a former manager of the Sydney Observatory, was one of the driving forces behind the Warrumbungle Dark Sky Park project.

Cheerio,

Jean-Luc Gaubicher

Important Reminder:

The February 2019 Object of the Month is NGC 1365 Great Barred Spiral Galaxy.

Please send your images (with a short description of how the image was taken) or articles to bpetschel@gmail.com by 28th February

The Winning Photo for January

The winner for the month of January is Kym Haines with this absolutely stunning picture. I believe this one sets the bar very high for next months!



Target: M42/Orion Nebula

Telescope: Ritchey Chretien 14" f/8 2850mm

Camera: FLI PL09000 (monochrome with filter wheel)

Mount: Paramount MX+

Exposures: 30 x 1min for luminance, 5 x 2min for red, 5 x 2min for green, 5 x 2min for blue

Location: suburban Sydney

Date: 25 Dec 18

High dynamic range processing has been used to prevent the Trapezium area being over-exposed.

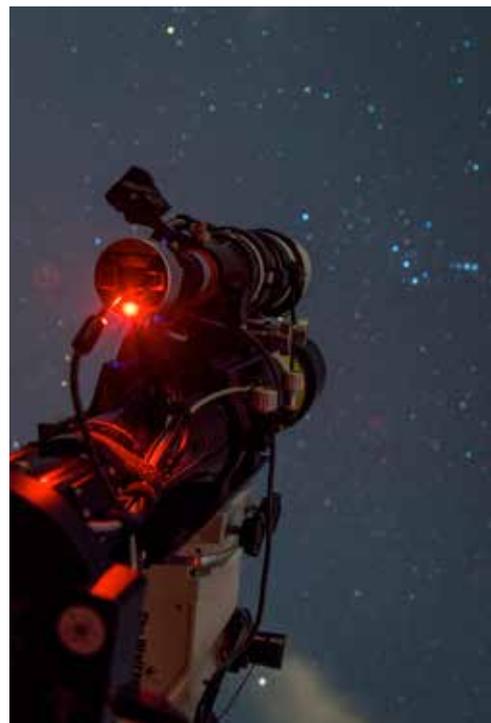
Kym Haines

The Runner-Up Photos for January

Thought to share with you my image of M42 (+M43 and Running Man Nebula) captured from our Terrey Hills observing site on Saturday Jan 12.

Image integration comprises best of 20x30s LRGB and 20x15s LRGB captured using a William Optics ZenithStar 110 Triplet refractor on an AZ-EQ6 mount with a ZWO 1600MM-C camera and processed using PixInsight, Lightroom and Photoshop.

Daniel Patos



The visual magnitude is about 4, which makes it visible to the naked eye.

The darker the location the better the object looks.

Just last week we were at the Sydney Botanical Gardens in the City and the nebula was naked eye visible.

As the size of the telescope is increased the nebula start to show its real beauty.

In the centre of the nebula, in a dark patch is the Trapezium, a cluster of 8 stars, the brighter 4 are easily seen in a small telescope.

This nebula is one of the most photographed objects in the sky.

On Saturday 12th January, I photographed the Orion Nebula from Terrey Hills.

I used my Meade LX200-ACF, 8", F10, and the Atik Infinity Camera at prime focus, with a 6.3 focal length reduce.

The attached pictures are my results (the exposure is different in each).

Phil Angilley



The Winning Article for January

The NSAS object of the month for January was the Orion Nebula. (Messier 42, M42 or NGC1976). This nebula is a reflection/emission/diffuse one situated in the constellation of Orion, hence the name, and perhaps the brightest nebula in our sky.

Reflection nebulae are clouds of interstellar dust that reflect the light of nearby star(s). Emission nebulae are clouds of ionised gases that emit light excited by the high-energy radiation of hot stars within them. Diffuse nebulae do not have any well-defined boundaries, which possibly covers most nebulae.

Recent estimations of the distance from us to the Orion nebula vary but seem to be around 414 ± 7 and 412 ± 6 parsecs.

The brightest region of the nebula has probably been a star nursery for last 10 to 30 million years with the nebula itself thought to be less than 300 million years old.

Be quick to photograph it as within about 100,000 years, most of the nebula's gas and dust will be ejected and it will end up as a young open cluster, something like the Pleiades cluster.

The nebula, or maybe just this region of the sky, was perhaps first mentioned in the pre-telescope era of the Mayans of Central America.

The nebulosity itself was probably not noted until late 1610 while the brightest star were catalogued earlier, around late 16th and early 17th century, by people like Tycho Brahe, Johann Bayer and Galileo.

Nicholas-Claude Fabri de Peiresc, a French lawyer, probably made the first record of the nebula in history in 1610 using a refracting telescope and the first published information was by Johann Baptist Cysatus, a Jesuit mathematician and astronomer of Lucerne in 1611.

Charles Messier first noted the nebula on March 4, 1769 and later included it in the first edition of his catalogue in 1774.

William Huggins, first discovered the gaseous nature of the Orion nebula, in 1865 with the help of spectroscopy.

Messier first recorded the nebula as "Neb. in the sword of Orion" (English translation from Messier's French) with the following coordinates:

RA (M) 05:23:59

Dec (M) -05:34:06 (Mar-04-1769)

It's interesting to compare the coordinate entry made by Messier with today's values.

Messier's position precessed to 2000.0 coordinates:

RA (2000.0) 05:35:18.7

Dec -05:23:55

Modern coordinates:

RA (2000.0) 05:35.4

Dec -05:27

My coordinates for the photo after framing:

RA (2000.0) 05:35:10.42

Dec -05°26'02.95"

The first known drawing was done by Giovanni Batista Hodierna, around 1665, from Palma di Montechiaro in Sicily.

The Orion nebula was the first nebula to be photographed and the 10th astronomical object to be photographed, the earliest ones being the Moon in 1840 and then the Sun.

The nebula was first successfully photographed on September 30, 1880, by Henry Draper who was professor of chemistry and botany at the New York University and who used an 11" refracting telescope.

The first photographs of the nebula revealing stars and nebula details too faint for the naked eye, were taken by Andrew Ainslie Common in 1883 using dry plate processes.

He recorded images with a 36" reflecting telescope with exposures of up to 60 minutes from Ealing near London.

He concluded that long exposures with dry plates were able to record stars invisible to the eye in the same telescope.

Finally, it was my turn to photograph the nebula about 138 years after it was its first photography was taken, and about 409 years from when it was first recorded.

Messier listed the Orion Nebula, M42 (NGC1976), together with its smaller neighbour, M43 (NGC1982) as separate objects but I've treated M43 as part of my M42 photo.

Being one of the brightest nebula in the sky presented issues with exposure lengths to capture the brightest areas around the Trapezium cluster down to the darkest gases and dust in the fainter regions.

That basically meant that, with my camera and its limited dynamic range, I had to use multiple images with different exposure lengths, as well as modern softwares to combine the different exposures to create a high dynamic range final image.

Images with shorter exposures would be needed for the bright core and longer exposure images for the fainter portions of the nebula clouds.

As I didn't know what exposures to use, I knew I would first need to experiment with test images on the night.

After the initial setting up and alignment I would use Sequence Generator Pro (SGP) to manage the imaging.

Its "Framing and Mosaic Wizard", "Fetch the Target Area" needs an internet connection to get an object's image from say Astrobin, and then have SGP plate solve it to obtain the correct coordinates for the object.

Previously, I'd had issues with internet coverage and connecting to Astrobin on site as well as not having a sequence roughly setup in SGP first.

Solving these issues in the dark wastes imaging time and uses expensive mobile data, so this setup was mostly done at home.

The framing wizard set my target location for the sequence to RA = 05:35:10.42 and DEC = -05°26'02.95".

So, after setting up the target by finding a copy of the object in Astrobin, then framing, plate solving and setting up a rough sequence in SGP, I was ready to go. The planned observing night at Terrey Hills was for the January 5th and that would be my only opportunity in January to get the images.

As it turned out, Sydney was in the grip of clouds and rain around the new moon so, as we got closer to the date, it was not looking good.

As the 5th approached, I had my fingers crossed for the sky to clear but this was not to happen and the night was cancelled :-(

The weather cleared in the following days and was predicted to be cloudless on the next weekend, so Saturday the 12th was declared our alternated observation day.

I changed plans and targeted that night to get my M42 files.

By the following Saturday, the moon was getting brighter as it was a week past the dark new moon so I was fearing that extra light would play havoc with my LRGB images.

Moon set that night was 11:54 so my plan was to get narrow-band filtered images before midnight and the Red, Green and Blue filtered images after midnight.

The sky brightness that night ranged from 19.53 to 20.14 Mag/Sq Arcsec.

Before midnight, it was about 19.53 Mag/Sq Arcsec and after midnight, when the moon set, it was about 20.08 to 20.14 Mag/Sq Arcsec

The air temperature was about 22°C and sunk to about 18°C in the early morning. My imaging camera was set to -15°C and the OTA and Guider dew heaters set to about 5 °C above ambient. Unlike our December night where everything was very wet from dew by morning, we ended up with only a small amount of dew on that night.

Now, just to add a degree of difficulty, I also wanted to try polar alignment using a QHYCCD PoleMaster camera. Normally, I first use a magnetic compass sitting on a non-magnetic stick to keep the compass away from the iron in the tripod and mount to initially align the tripod with true south. I also use a spirit level to level the tripod before putting the mount on it. Then, with the mount and OTA assembled, the guide scope powered and connected, I would normally use the Windows application SharpCap Pro to fine-tune the polar alignment of the mount.

Under some circumstances, I've seen people perform a faster polar alignment using a PoleMaster camera and software. Unlike SharpCap that uses plate solving, PoleMaster needs a better knowledge of the stars around the South Celestial Pole. Fortunately, I had the help of a PoleMaster guru on the night, one of the many advantages of being in the club and attending a group activity. After using it, I feel I need more experience with PoleMaster, and more testing of both polar alignment method, so jury is still out on which one I prefer. Now, if the PoleMaster software used plate solving then it would be a no-brainer decision!

After experimenting with some initial test exposures, as well as monitoring exposures, I ended up taking the following narrow band images:

Hα	OIII	SII
25x30s	25x30s	25x30s
25x15s	25x15s	25x15s
25x60s		
9x180s		

Later, after midnight with the moon having set below the horizon and the narrowband images finished, I managed to get the following images:

Red	Green	SII
10x5s	10x5s	10x5s
20x15s	20x15s	20x15s
5x120s	5x120s	5x120s

In hindsight, I think I should have taken more, longer exposure R, G, B images, as well as some L and longer O3 and S2 images.

If January had two clear observation nights, I probably could have got those extra images :-)

At about 3:30am, with the nebula getting a bit low in the sky, we decided to call it a night.

The weather was expected to worsen earlier so I thought having clear skies until then, made it a good night.

It was also interesting that in the short time we took to pack, we noticed just as we were leaving, that the sky had gone completely white with fog or cloud, so Lady Luck was on our side.

I would not have got the RGB images if the sky did not stay clear that long.

The following day, I set up the telescope at home and took all the flats, darks and bias files.

This consisted of 50 bias files, 50 flat files for each filter and 50 dark files for each exposure at -15°C.

I'm new to PixInsight and still trying to learn my way around it and how to process images.

This was going to be my first nebula object and the second object I would process in PixInsight.

My first attempt was last month's Wirtanen Comet 46P and this month's editing benefited from that experience.

With lessons learned and fewer stumbles I had less difficulty with the process.

I also suspect I again encountered a few more bugs in PixInsight with various crashes along the way.

While my images were finished before the latest software update, PixInsight has just been updated to version 1.8.6.1457. Reading the release notes, I see fixes were included that looked like the errors I encountered. So, hopefully, the next time I use it, I'll have no crashes.

The nebula also presented an extra degree of difficulty in combining the images, with it being so bright in the centre and dim in the outer regions.

I was interested in HDR (High Dynamic Range) image processing so this was yet something else I had to try before I could get an image of this month's object.

There I learned that short-exposure images have to be sufficiently long to provide enough stars to be able to align them with the longer exposure images.

Other lessons learned were things like what colour channels to assign the narrow band images to, and how to mix the resulting image with the RGB image and combining images of different exposures to increase the overall dynamic range of the exposure. Some of the known unknowns of PixInsight with more unknown unknowns to discover in the future!

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Here are some pictures that illustrate Greg's article:



Setting up on Sat 12/1/2019
While there were a few visual astronomers until about midnight we were two astrophotographers that night who were there at 7:30pm and left at 4am the next morning.



RGB image



Narrow band image



RGB and narrow band images combined

The Runner-up Article for January

The Great Orion Nebula, also known as Messier 42 (M42) and NGC 1976, is one of the brightest diffusive emission and reflection nebulae observable from Earth.

Although visible to the naked eye in good conditions under a dark sky, the Orion nebula was not mentioned by any astronomers of the antiquity.

It was not until the beginning of the seventeenth century that its discovery was officially announced with the observations made by the French polymath Nicolas Claude Fabri de Peiresc from November 26, 1610.

Galileo, though a friend of Peiresc, never reported having observed it.

The Swiss astronomer and mathematician Jean-Baptiste Cysat further observed it in 1618 and Giovanni Batista Hodierna, a Sicilian priest, astronomer and architect, drew a sketch of the Trapezium in the 1650s but the first detailed drawings of the nebula were made by Christian Huygens.

Of course it is Charles Messier who catalogued the 42nd and 43rd nebulae in

his famous catalogue to avoid confusing them with comets.

The Orion nebula is the most visible part of a huge molecular cloud.

Within it, in an area spanning about 24 light-years, are hundreds of stars in their infancy, buried in their cocoons of gas and dust.

Others, that are a bit older, sculpt their environment with their ultraviolet radiation, creating the nebula's cavernous hollowed shape.

This small group of most ardent and massive stars is nicknamed the Trapezium and is one of the youngest known open clusters.

Keen observers may note that this nebula present a complex gradient of colours from greenish to red and blue-violet.

The red hue is emitted as a result of the H α recombination line radiation at a wavelength of 656.3 nm.

The blue-violet coloration is the reflected radiation from the massive O-class stars

that lie at the core of the nebula.

The green hue was a puzzle for astronomers in the early part of the 20th century because none of the spectral lines known at that time could explain it.

There was some speculation that the lines were caused by a new element, and the name nebulium was coined for this mysterious material.

However, it was later determined that the green spectrum was caused by a low-probability electron transition in doubly ionized oxygen, a so-called "forbidden transition".

About 1,400 light-years away from Earth, the great Orion Nebula is one of the most photographed objects by amateur astronomers and we can expect our own keen astrophotographers to come up with some stunning pictures too.

Jean-Luc Gaubicher

Sources: Wikipedia – Futura-Sciences – Astrosurf.

Hors Concours

I know that the object of the month for January is M42, but for me it was more like event of the month, that is to say the Jupiter/Venus conjunction on January 22nd and 23rd.

I made a sketch of this event at the eyepiece and then digitized, inverted and cleaned.

Ilya Genkin

