

Vol 31 No. 2

From the President

By Chris Angelos

To me, those people who do amateur astronomy are an exceptional group. They have a love of the natural world, especially that seen in the night sky. They want to view it, know it and share it with other people. Whether you are a frequent or casual observer of the night sky, the Fremont Peak Observatory is a place that greatly facilitates those activities. With a reasonably dark night sky, space for people to gather, a meeting room to hear talks about astronomy, and the 30 inch Challenger telescope open to the public, the Observatory gives park visitors an experience of nature that reaches far beyond the boundaries of the park. Both longtime supporters of the FPOA and those who are new to FPOA have these interests in common. It is natural for people with same interests to want to get together.

Such an opportunity exists at the FPOA's annual Potluck Picnic, Star Party, and meeting, the 29th Annual Fremont Peak Star-B-Que. This year's Star -B-Que occurs on Saturday, August 23 and a lot of effort goes into the event. In the past and by popular demand the Star-B-Que program includes a guest speaker, an astronomical trivia contest, a contest of those astronomically correct pot luck food items, activities for kids, a raffle, and BBQ chicken, hot dogs, and hamburgers provided by the FPOA. Most important, this is the time that FPOA members give their input to shape the leadership of the organization by electing FPOA members to serve on the FPOA Board of Directors.

The Board of Directors are those FPOA members who put in extra time to make possible the operation of the Fremont Peak Observatory. They direct maintenance of the Observatory facilities and do what is necessary to keep the FPOA a viable 501C3 corporation with the state of California and the Federal government. The FPOA Board members also work with the California Department of Parks to maintain the FPOA's concessionaire status at Fremont Peak State Park. Incidentally, if being a board member sounds like something interesting to you and you have some name recognition with FPOA members then why not do more than

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Summer 2014

FPOA Programs 2014

Special Events

Star-B-Que

Aug 23

Member Appreciation Night Sept 20

Saturday Evening Programs

Apr 5, 26 May 3, 24, 31 Jun 7, 21, 28 Jul 5, 19, 26 Aug 2, 16, 23, 30 Sept 13, 20, 27 Oct 18, 25

Solar Programs

Mar 29 Apr 26 May 31 Jun 26 Jul 28 Aug 23 Sept 20 Oct 25

Board Meetings

Jan 25	Feb 22	Mar 29	Apr 26
May 31	Jun 28	Jul 26	Aug 23
Sept 20	Oct 25	Nov 15	

Please check <u>http://www.fpoa.net/schedule.html</u> for changes or updates to this schedule.

UNUSUAL OBJECTS IN THE FAR SOUTH OF SCORPIUS

By Patrick Donnelly

The months of July and August allow observers at the Fremont Peak Observatory an opportunity to view some unusual objects in the constellation Scorpius, the scorpion. Scorpius is a zodiacal constellation located in the southern skies. Only when Scorpius is high in the south are these unusual and picturesque objects visible. Because of *Continued Page 2* their far southern location on the celestial sphere, one should consider this tour to be through the back roads of Scorpius.

One can begin this tour of Scorpius at the "Cat's Eyes." The Cat's Eyes, λ and u-Scorpii, are located at the Scorpion's stinger on the tail of the scorpion. Lambda-Scorpii, Shaula, is the second brightest star in Scorpius (magnitude +1.6) and is also the 24th brightest fixed star on the celestial sphere. Lambda is actually a spectroscopic triple system, consisting of two (2) blue-white giant stars of spectral class B2 and a pre-main sequence star. Lambda is located approximately 570 light years from the earth. It is, obviously, the brighter of the two (2) stars on the stinger. If you find that λ -Scorpii being the second brightest star in the constellation is unusual, consider the following. The third brightest star in Scorpius, today, is δ -Scorpii (magnitude +1.7), and the fourth brightest is θ-Scorpii (magnitude +1.87).

Just east of λ -Scorpii is the third magnitude star G-Scorpii. G-Scorpii is interesting because just 4 ½ arc minutes east of G-Scorpii is the globular cluster NGC -6441. NGC-6441 is an 8th magnitude globular about 35,000 light years from the earth. In a small telescope at low power or binoculars the G-Scorpii/NGC-6441 pair looks like a double star. With a 6" or larger scope the true nature of NGC-6441 can be seen. NGC-6441 is readily visible in the 11x80 binoculars at the observatory, which makes one wonder why Messier never saw the globular cluster. However, the answer may be that the globular was too far south or too small in area. It is 2° below M7, which is the farthest south Messier object.

To the west of λ -Scorpii and 2° farther south is the fantastic region known as the "False Comet." The False Comet appears to the unaided eye as a comet with nucleus, comma, and tail. It actually is four (4) closely grouped open clusters, NGC-6231, H12, Trumpler 24, and NGC-6242 along with Zeta-Scorpii 1 & 2 (ζ-Scorpii 1 & 2). All four (4) of the open clusters can be seen together in the 11x80 binoculars at the observatory. It is one of my favorite binocular objects and one that I show to the public during public programmes. At the heart of the False Comet is the galactic cluster NGC-6231. The cluster is known as the "Northern Jewel Box." It consists of approximately 120 stars located approximately 6,000 light years from the earth, most of which are young, extremely bright O and B spectral type stars. Through the 30" Challenger telescope NGC-6231 displays several colours in a very compact area to give it its "Northern Jewel Box" nickname. If NGC-6231 was at the same distance from the earth as the Pleiades

(~400 light years), it would appear to be the same size as the Pleiades, but it would be 50 times brighter. NGC-6231 would shine with a combined apparent visual magnitude of approximately -1.6 (about as bright as Sirius). Moreover, at this distance any supernova from one of the O or B type stars in the cluster would have some effect on the life on earth. Zeta –Scorpii 1 is the brightest member of NGC-6231, although it is some distance from the center of the cluster. Along with Zeta-Scorpii 2 it forms the nucleus of the False Comet.

NGC-6231 is associated with the much larger open cluster H12, which is just north of NGC-6231. NGC-6231, ζ -Scorpii 1, and H12 together comprise the much larger asterism known as Trumpler 24. Above the Trumpler 24 complex is another small open cluster NGC-6242. NGC-6242 is located in the tail of the comet. These four (4) star clusters together outline one of the spiral arms of our Milky Way galaxy. I sure wish this complex of clusters was farther north, so that Messier could have seen them.

In conclusion, if you have not explored the far southern areas of Scorpius, you are missing some of the best deep sky objects in Scorpius.

<u>Nebula</u>

By Rob Hawley

This is an example of the material presented in one of our lectures at the observatory. For the reader this may be a review, but it will give you an idea of the type of material we are presenting to the public.

"Nebula" is a rather generalized term, that like many astronomical terms, was applied based on early observers impressions of an object rather than once an object was understood. Thus, in at least two cases that will be sited, the name was inappropriate. In one case, we still use a description coined in the 1700's. In another case, the designation was so wrong that the term has been replaced.

A nebula is an area of diffuse gas or dust. But from there the origin and properties of the nebula differ greatly. All would be considered near perfect vacuums on earth having a mere 100 - 10,000 particles per cm³. By comparison air is about 10^{19} particles and interstellar space is about 1.

The reason nebula are visible at all is because they are very large. For example the Orion nebula is about 12 light years (70 trillion miles) across. That is a lot of cm³s!

Let's examine each type of nebula and explore its part of the story of the universe.

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Nebula

Bright (aka Emission) Nebula

Bright Nebula are the rock stars of the nebula family since some of them are observable with your naked eyes.

The brightest in the Northern Hemisphere is the Orion Nebula (Messier 42), which is the "sword" of the hunter in the winter sky.



Like many bright nebulae, this is a star forming region. The dust and gas of the nebula is compressed by the bright stars of the Trapezium, forming clumps. The clumps of gas/dust then collapse under their own gravity to form new star systems.

Bright nebulae are bright because the radiation from the bright stars cause the gas to fluoresce. Think of a neon sign or a mercury lamp. Each of the elements making up the gas fluoresces in its own unique way. This gives us a trick we can use to deduce the components of the nebula and a way to view it under light polluted skies. It is also why Emission Nebula is another term for this type of object.

Bright nebulae will eventually disperse, leaving a new open cluster in its place. One can see that today in M16 and M8.

Dark Nebula

If the region of the sky is poor in gas, but rich in dust then something different happens. Instead of being a bright star forming region, what appears looks more like a hole in the sky (at least visually). Dark nebulae contain dust grains whose size disperse visible light. To the human eye, that makes them "dark". However, scientists use may different wavelengths to examine the sky. Other kinds of light such as radio or X-Rays pass right through dark nebulae.



The most famous dark nebula is the Coal Sack which is visible in the sky south of the US. It sits right next to the Southern Cross, which is on the Australian and New Zealand flags.

Note the bright red area in the right of the picture. That is another famous bright nebula – Eta Carina (also called the Keyhole Nebula).

"Planetary" Nebula

When William Hershel began cataloging objects in the late 1700's he noticed a number that appeared to be little green glowing "puffs". Hershel thought they resembled Uranus so he called them planetary nebula. During the summer programs, we show our guests some of the most famous namely M 57 (Ring) and M 27 (Dumbbell). However, in many ways these are not typical. The image below is NGC 6886 and is closer in appearance to an average Planetary nebula. It appears as a little blue powder-puff. Sometimes more structure is reveled in photographs. At other times they just remain a puff.



NGC 6886 Continued Page 4

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Nebula

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So if these are not planets and they are not "bright" then what are they? As bright nebulae herald the birth of stars, these herald the death of a star (at least a sun-sized) star. When a solar mass star approaches the end of its life it grows to a red giant in a last attempt to balance gravity and nuclear fusion. For a time this works, but eventually the outer layers become detached and drift away. The remainder then collapses into a white dwarf. Planetary nebula are rich in Oxygen and Carbon since these elements are created in the end stages of the life of a medium sized star.

Super Nova Remnant (SRN)

For larger stars than our sun, the end is more dramatic. The first object Messier cataloged is the debris field of a star that supernovaed in 1054 AD. The gas and dust thrown off by that explosion is rapidly expanding and is now about 5.5 Light Years across.





Several SNR's are visible in the northern sky. This time of the year, guests will be shown the Veil Nebula. The Veil is almost 4 degrees square and is a huge object in absolute terms.

Eventually the debris generated by this explosion will be incorporated into new bright nebulae which, in turn, will form new star systems. This will continue the process. The stuff that we are made of was, at one point, in a supernova (or Planetary nebula).

Reflection Nebula

The last type of nebula is the reflection nebula. As the name suggests, the brightness is not do to

to florescence, but simple reflection of star light. The two best known reflection nebulae are the aqua portion of M 20 (shown below) and Messier 78 in Orion.



Observing Tricks

Because much of the light from bright, planetary, and SNRs is due to the florescence of the elements making up the nebula, an observer can use filters to make the nebula more visible. The famous "Pillars of Creation" Hubble photo is just that - combining the light captured by Oxygen, Sulfur, and Hydrogen filters.

Unfortunately for visual observers, the strongest lines of Hydrogen and Sulfur are at the very limits of human color vision. Most consumer digital cameras filter this light. Fortunately Oxygen glows in aqua which is near the most sensitive area of human night vision. Thus using what is called an "Oxygen III" filter makes these objects stand out against the background of stars (and light pollution).

Some objects do not have much Oxygen in them. An example is the nebula illuminating the Horsehead Nebula (which itself is a dark nebula). For these, visual observers use a Hydrogen Beta filter. This passes another emission line of Hydrogen that the eyes are more sensitive to. Unfortunately, this line is much weaker than the bright red line.

"Spiral" Nebula

This now retired term was the original name for the class of objects that appeared as organized

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than vote for someone else to be a director. Why not put your name on the ballot as well. The FPOA has openings for new board members this year. So, if you are reading this article before August 23 then you'll want to RSPV for the Star-B-Que by sending an email to <u>info@fpoa.net.</u>

Nebula

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structures instead of merely gas. After Hubble's work in the 1920's it was clear a new name was required. We now call these galaxies. **References**

NGC 6886

The STScI Digitized Sky Survey

CoalSack

http://oneminuteastronomer.com/2036/ coalsack-nebula/

M20

Hunter Wilson Wikipedia

Others

2014 Membership Renewal

Renewals are easy. You can use the forms on the membership page <u>http://www.fpoa.net/</u><u>membership.html</u> to pay with either PayPal or via a credit card. For those preferring paper you can just send a check (that has your current correct address) to : FPOA Membership, c/o Rob Hawley, 1233 Hill-crest Dr, San Jose CA 95120

If you email has changed then please be sure to include that in either the PayPal payment as a comment or a note with your check.

EMAIL DELIVERY OF THE OBSERVER

Dear FPOA Members,

We have been delivering the Observer via email for the past several years. This obviously saves the Association postal expenses, and assures the quickest delivery to you. However, several of you no longer have valid email addresses, due to ISP changes, moves, etc. If you would like to continue to receive, or begin to receive, notification of the Observer via email, please send your current email address to membership at fpoa.net

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