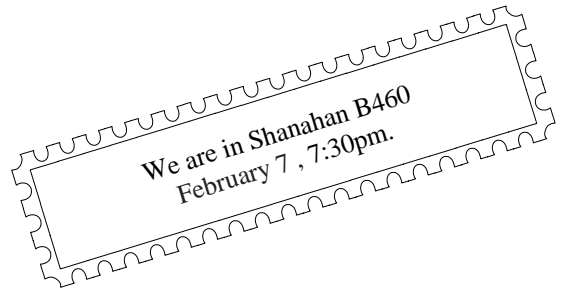




Newsletter of the Pomona Valley Amateur Astronomers

The essence of life is statistical improbability on a colossal scale.

Richard Dawkins



Volume 40 Number 2

nightwatch

February 2020

Speaker Announcement

Our speaker this month is NASA Solar System Ambassador, Salem Emara, who will speak on the Mars Insight Mission. I'll also give an off-topic short talk on our adventures getting a giant dinosaur bone out of the Utah desert last October.

The meeting is in Shanahan B460 on the Harvey Mudd campus, this Friday, February 7, at 7:30 PM. I hope to see you there!

Matt Wedel

You can read these articles for a preview of the paleontology part of our February program:

<https://svpow.com/>

<https://news.westernu.edu/westernu-paleontologist-helps-recover-rare-brachiosaurus-in-utah/>

<https://www.abc.net.au/news/science/2020-01-30/rare-two-metre-long-dinosaur-bone-unveiled-brachiosaurus/11910130>

PVAA Officers and Board

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Jim Bridgewater (2018).....	909-599-7123
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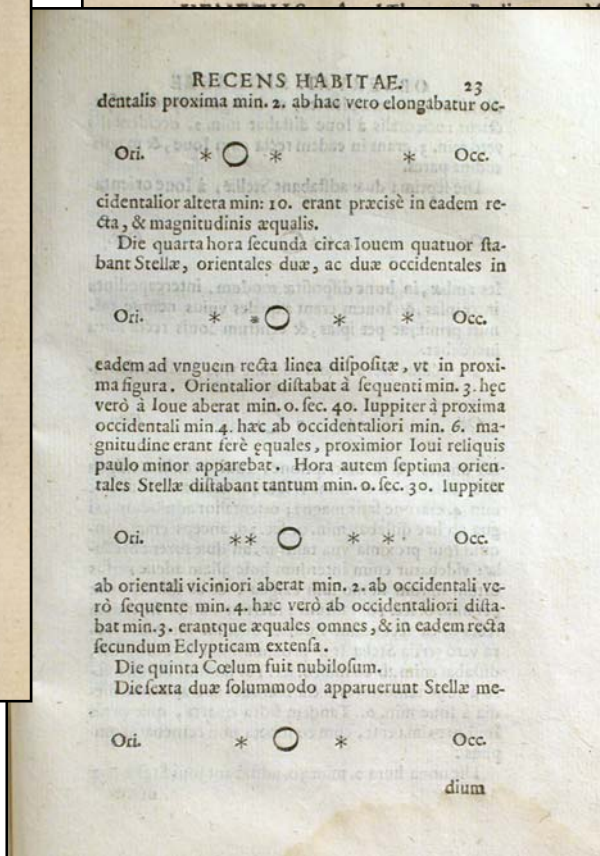
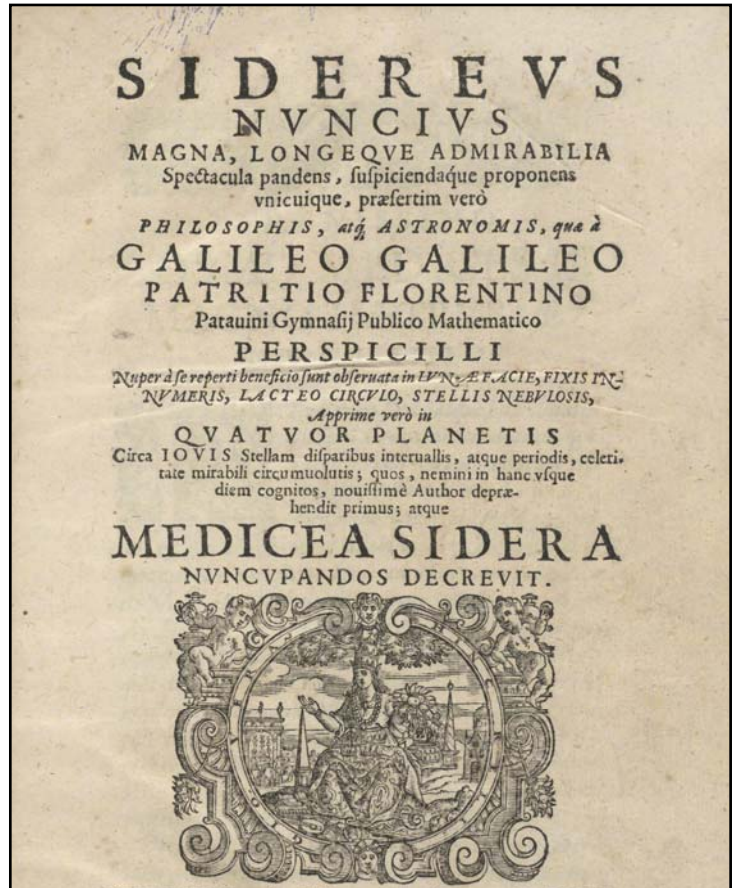
Membership / Publicity....	Gary Thompson ..	909-935-5509
Outreach	Jeff Schroeder	909-758-1840
Programs	Ron Hoekwater	909-391-1943

General Meeting 01/10/20

The moon will occult Mars the early morning of 2/18/20. For the Los Angeles area Mars will pass behind the moon at 3:37:00 am PST, and reappear at 4:27:13 am.

Our speaker for the evening was Alex McConahay. He is a member of PVAA and RAS (Riverside Astronomical Society). The title of his presentation was "5 Astro Images that Destroyed the World". Alex asked the questions: "Who are we?" and "Where are we?" We have been looking up at the cosmos since the dawn of man. The Orion constellation was found carved into a Mammoth bone, showing that even prehistoric man charted the stars. Aristotle described the movement in the Heavens as "imperfect circles", which now bring us to our 1st image.

In 1610 Galileo Galilei published "Sidereus, Nuncius" which contained depictions of Jupiter and 4 moons. The moons orbited Jupiter, and not Earth which went against the commonly held belief that everything orbited the Earth. The publication also had images of the moon, showing craters, mountains and 'imperfections' in the heavenly body. He also pointed out that the sun has 'sun spots', and it too was not perfect.



D C X,

The 2nd image in Alex's collection is from 1905, proving Einstein correct that the sun 'bent' space to see stars behind it. This happened during the 1905 solar eclipse that showed stars in the sky that were behind the sun. This showed that the light did not travel in a straight line, but curved around the gravitational field of the sun to be seen thus proving Einstein's Theory.



LIGHTS ALL ASKEW IN THE HEAVENS

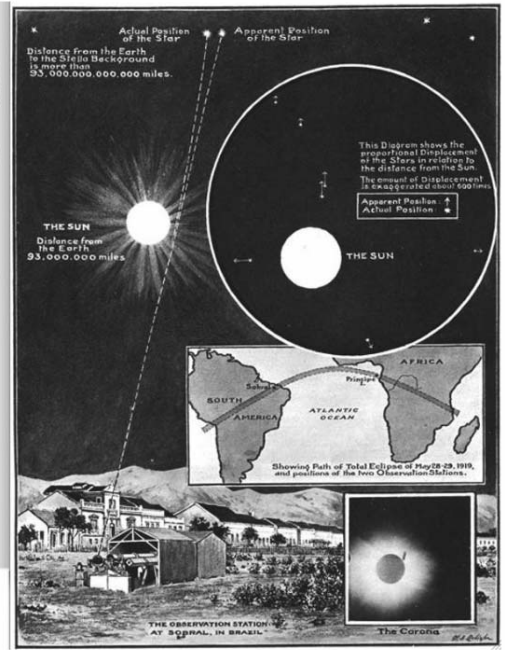
Men of Science More or Less
Agog Over Results of Eclipse
Observations.

EINSTEIN THEORY TRIUMPHS

Stars Not Where They Seemed
or Were Calculated to be,
but Nobody Need Worry.

A BOOK FOR 12 WISE MEN

No More in All the World Could
Comprehend It, Said Einstein When
His Daring Publishers Accepted It.

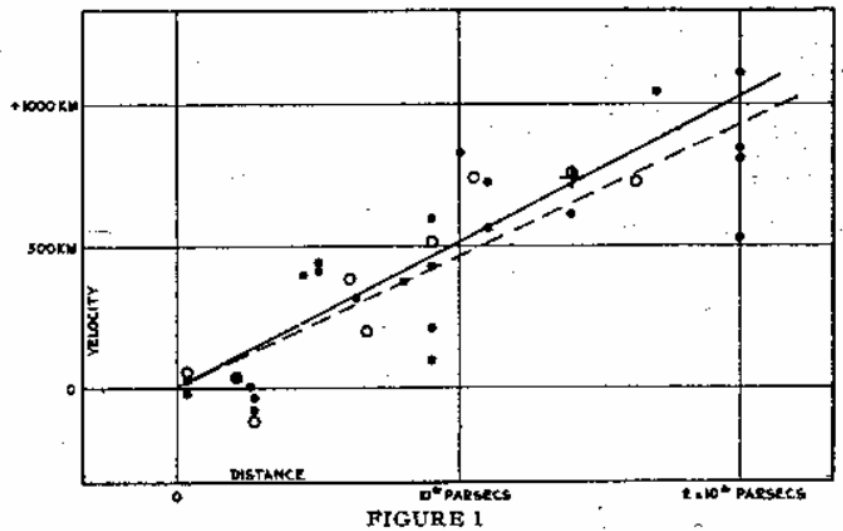


A headline from the New York Times (L) and the Illustrated London News (R)

The 3rd image is based on "The Great Debate" between Harlow Shapley and Herber Curtis. Is the universe just the Milky Way, or is it bigger? Shapley believed that 'spiral nebulae' like Andromeda and Pinwheel were simply part of the Milky Way, while Curtis argued that they are separate galaxies unto themselves. In his endeavor to prove Curtis wrong after the debate, he actually proved Curtis right. The universe is much bigger than the Milky Way.

The 4th image is actually a graph showing that the farther away an object is, the faster it is moving, relative to us. The universe is expanding at an ever accelerating rate, like dots on a balloon that is being inflated.

Velocity-Distance Relation among Extra-Galactic Nebulae.





The final picture is "Earthrise" taken by Bill Anders on December 24th, 1968 while orbiting the moon on the Apollo 8 mission.

Gary Thompson

Club Events Calendar

Feb 7 General Meeting – Mars Insight Mission and Dino Bones

Feb 22 Star Party – Mecca Beach, Salton Sea

Feb 26 Board Meeting

Mar 6 General Meeting

Mar 21 Star Party – Mecca Beach, Salton Sea

Apr 1 Board Meeting

Apr 10 General Meeting - Apollo 13)

Apr 25 Star Party – Afton Canyon

Apr 29 Board Meeting

May 8 General Meeting

May 23 Star Party -- TBD

May 27 Board Meeting

Jun 5 General Meeting

Jun 20 Star Party – TBD

Jul 22 Board Meeting

Jul 31 General Meeting

Aug 15 Star Party -- TBD

Aug 19 Board Meeting

Aug 28 General Meeting

Sep 12 Star Party -- TBD

Sep 16 Board Meeting

Sep 25 General Meeting

Oct 10 Star Party -- TBD

Oct 21 Board Meeting

Oct 30 General Meeting

Nov 7 Star Party -- TBD

Nov 11 Board Meeting

RB66

There was a new addition to our astronomical optics family this month: a large binocular designed and built about fifteen years ago by JMI. This binocular comprises two six-inch F/5 reflectors. It weighs about fifty pounds and is mounted on a small but stable tripod. The unusual design aspect is that instead of having this lofted over your head and craning your neck up at the sky, the Newtonian focusers are arranged so that you are looking down, towards the primary mirrors, with your head between the two optical tubes.

The design adds to the comfort of observation and aids substantially in stability and convenience.

Claire and John Stover were helpful in getting this binocular to me. They were intermediaries between me and the seller who lived in Chico, a little over an hour from their place in Knights Landing. They met with the guy and paid him off, and then brought the binocular down to southern Cal the week before new moon.

There were a half dozen club members and a few more groupies at GMARS, the Riverside club's site in Landers, where we took the binocular for First Light (for us). I happened already to have two Meade 20mm wide angle Plossls, and a pair of Meade 9.7mm Plossls. I have no idea how I came by doubles of these, but they were ready-made for a binocular telescope setup. Even better was the fact that Ron Hoekwater had a 24mm Panoptic, as did a friend of mine here in Claremont who, although new to astronomy, is pretty well geared up. So, using the Panoptics with their 1 ¼ inch barrels, I could view at 31x with a 2.2 degree field of view.

Let me say right now, there is a lot of hype about binocular viewing, and I've bought into most of it. Among the fans, there is a statement floating around that using both eyes adds 30 or 40 percent to the amount that you can see. That's a little vague, but let's say that that increase, at 33 percent, makes your six-inch optics more like 8-inch optics. And then there is another Old Wives' rule of thumb that observing comfortably, which is possible with this setup—standing comfortably, viewing down more or less naturally, not up, no squinting or facial contortion—well the Old Wives rule of thumb is that that adds 2 inches to aperture. So now we are up to a 10-inch scope equivalent.

Well, I'm not prepared to make that leap just yet, but I will say that for my money the view was quite nice. There was much structure in M42 at 31 power using the Panoptics or at 37 power using the 20mm Meades. M81 and M82 were very nicely set together in the 2.2 degree field of the Panoptics. M31 and its satellite galaxy were visible for a few hours early in the evening and because of the wide field and relatively high power (for a binocular) it was one of the nicest views I've had. We spent some time on the Double Cluster and could just barely see the Crab Nebula. It was visible though. I went to bed about 11 but got up before dawn to easily catch M57, the Ring Nebula and M4 in Scorpius.



Binoculars are not the simple instruments that their ubiquity might imply. One needs to take care of three or four factors. The interpupillary distance has to be set, each optic must be focused, and the binos must be collimated. In regular binoculars, the IP is set by squeezing the tubes together or adjusting them apart on the hinge. The focus is commonly done with a center wheel to get the left eyepiece right and then the "diopter" adjust on the right tube is tweaked in. And collimation, or merging or fusing of the images is normally set at the factory and isn't readily adjustable. (Although you'd be surprised how many binos get out of whack then the owners just live with them or put them away in a closet where they linger for years)

All of the settings mentioned are done with electric motors in the JMI RB-66 binocular. First you set the IP using a left-right rocker switch that drives the eyepieces nearer or farther from each other. This is done by sight, ensuring that the views through both eyepieces are coincident. I know that my IPD is 63mm, well within the adjustment range of the RB-66. Next, the focus of each tube is adjusted with a pair of red button switches conveniently placed. I normally cover up the off-tube while I adjust the other's focus. Then I repeat the procedure for the other eyepiece. Finally, especially after changing eyepieces, I'll see that the images do not merge. There are two more rocker switches: the right one rocks the right mirror back and forth, moving the right tube's image left and right. You simply align the two images one over or below the other. Then, you operate the left tubes rocker switch that tilts the left telescope mirror up or down, moving the two images closer or farther apart in the vertical direction. You simply bring them together by operation of the switch and you are done.

All of this takes a lot longer to describe than to actually accomplish. I encouraged all visitors to the binocular to play with the adjustments, but I don't think many did it all the way, which is too bad. It's easy and really gives a rewarding view.

I look forward to bringing this big bino to future star parties. I'm already looking at February at GMARS. I also am anxious to see how it handles the summer sky at the Grand Canyon in June, and when I go up to Oregon, probably later in the Summer.

Ludd A. Trozpek



NASA Night Sky Notes

February 2020

**This article is distributed by NASA Night Sky Network**

The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!

Betelgeuse and the Crab Nebula: Stellar Death and Rebirth

David Prosper

What happens when a star dies? Stargazers are paying close attention to the red giant star **Betelgeuse** since it recently dimmed in brightness, causing speculation that it may soon end in a brilliant supernova. While it likely won't explode quite yet, we can preview its fate by observing the nearby **Crab Nebula**.

Betelgeuse, despite its recent dimming, is still easy to find as the red-hued shoulder star of Orion. A known variable star, Betelgeuse usually competes for the position of the brightest star in Orion with brilliant blue-white Rigel, but recently its brightness has faded to below that of nearby Aldebaran, in Taurus. Betelgeuse is a young star, estimated to be a few million years old, but due to its giant size it leads a fast and furious life. This massive star, known as a supergiant, exhausted the hydrogen fuel in its core and began to fuse helium instead, which caused the outer layers of the star to cool and swell dramatically in size. Betelgeuse is one of the only stars for which we have any kind of detailed surface observations due to its huge size – somewhere between the diameter of the orbits of Mars and Jupiter - and relatively close distance of about 642 light-years. Betelgeuse is also a “runaway star,” with its remarkable speed possibly triggered by merging with a smaller companion star. If that is the case, Betelgeuse may actually have millions of years left! So, Betelgeuse may not explode soon after all; or it might explode tomorrow! We have much more to learn about this intriguing star.

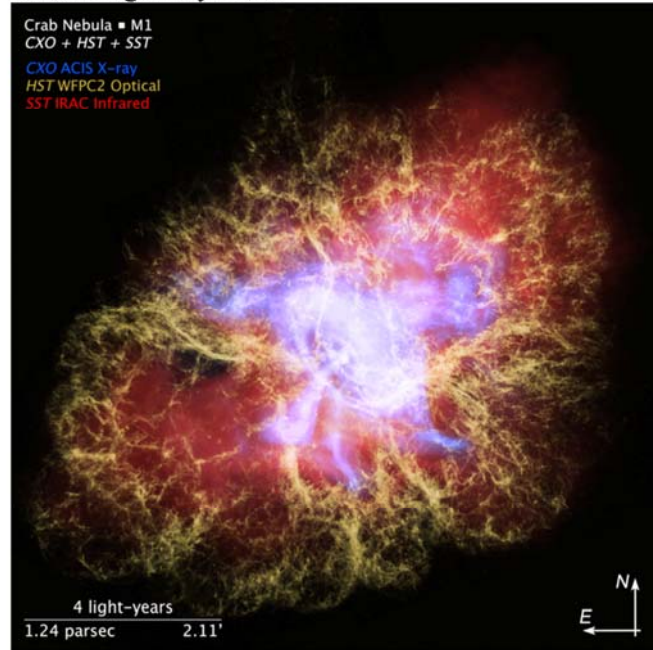
The **Crab Nebula** (M1) is relatively close to Betelgeuse in the sky, in the nearby constellation of Taurus. Its ghostly, spidery gas clouds result from a massive explosion; a supernova observed by astronomers in 1054! A backyard telescope allows you to see some details, but only advanced telescopes reveal the rapidly spinning neutron star found in its center: the last stellar remnant from that cataclysmic event. These gas clouds were created during the giant star's violent demise and expand ever outward to enrich the universe with heavy elements like silicon, iron, and nickel. These element-rich clouds are like a cosmic fertilizer, making rocky planets like our own Earth possible. Supernova also send out powerful shock waves that help trigger star formation. In fact, if it wasn't for a long-ago supernova, our solar system - along with all of us - wouldn't exist! You can learn much more about the Crab Nebula and its neutron star in a new video from NASA's Universe of Learning, created from observations by the Great Observatories of Hubble, Chandra, and Spitzer: bit.ly/CrabNebulaVisual

Our last three articles covered the life cycle of stars from observing two neighboring constellations: Orion and Taurus! Our stargazing took us to the “baby stars” found in the stellar nursery of the Orion Nebula, onwards to the teenage stars of the Pleiades and young adult stars of the Hyades, and ended with dying Betelgeuse and the stellar corpse of the Crab Nebula. Want to know more about the life cycle of stars? Explore stellar evolution with “The Lives of Stars” activity and handout: bit.ly/starlifeanddeath .

Check out NASA's most up to date observations of supernova and their remains at nasa.gov

NASA Night Sky Notes

February 2020



This image of the Crab Nebula combines X-ray observations from Chandra, optical observations from Hubble, and infrared observations from Spitzer to reveal intricate detail. Notice how the violent energy radiates out from the rapidly spinning neutron star in the center of the nebula (also known as a pulsar) and heats up the surrounding gas. More about this incredible “pulsar wind nebula” can be found at bit.ly/Crab3D. Credit: NASA, ESA, F. Summers, J. Olmsted, L. Hustak, J. DePasquale and G. Bacon (STScI), N. Wolk (CfA), and R. Hurt (Caltech/IPAC)



Spot Betelgeuse and the Crab Nebula after sunset! A telescope is needed to spot the ghostly Crab.