Nightfall

Monthly publication of the Huachuca Astronomy Club

September 2013

President's Notes

This month's notes are by Ted Forte, HAC Secretary.

It is that time of year to announce board positions that have openings. We are looking to fill the following positions on the board; club president, club treasurer, and one member at large. Bert Kelher and Gary Grue are on the nominating committee this year and all interested parties can contact them on their cell numbers. Bert's and Gary's cell phone numbers are 520-508-1535 and 559-760-3827 respectively. Both Bert and Gary will also be contacting members by phone to see who would be interested in volunteering for the positions. They are excited to have such strong support among all our members and look forward for volunteers to fill these positions. Elections are scheduled for the November general meeting.

September 28 is **Dine Under The Stars,** the major fundraiser for the University South Foundation. HAC members will support the event by opening and operating the Paterson Observatory. All members are invited to assist at the observatory.

October 5 is the **Kartchner Star Party** at Kartchner Caverns State Park. We will join with members of the Verde Valley Astronomers and other amateurs from around the state to support this outreach event. Members are encouraged to set up for solar observing in the afternoon. At 5:30, there will be talk at the visitors center by Steve Kortenkamp, an astronomer at the Planetary Science Institute in Tucson. And then deep sky observing after dark.

We will celebrate **Astronomy Day** on Saturday, October 12 at the Patterson Observatory. All members are invited to participate. We will be setting up to do solar observing at 1PM. There will be a break from 4PM to 7PM when we will reconvene for night time observing. It is also "International Observe the Moon Night" and the first quarter moon will present quite a target.. Come on out and help us "Bring Astronomy to the People"

Next Meeting

The September meeting will be held on September 27, at 7:00 PM in the Student Union Building at Cochise Community College. The program to be announced.

New Members Corner

We would like to welcome back, Bruce Gary of Hereford who rejoined the club at the August meeting. Gary operates the Hereford Arizona Observatory where he made his recovery of Comet ISON on August 12, 2013. We welcome new member Alex Woronow, who is building a remote observatory outside of Silver City N.M. Alex has his BS in astronomy from UC Berkeley, and is emeritus faculty from the Univ. of Houston.

Astronomical League Observing Programs - Planetary Nebula September Edition

by Ted Forte
(Captured from the HACList)

Last month I presented a list of 31 planetary nebulae from the Astronomical League's Planetary Nebula Program that were well placed for August observations. (See message 11330 from July 30) If the clouds covered them up, take heart in the knowledge that they all remain visible this month and some will be above our horizon well into November.

The list of PNe in the Planetary Nebula Program that are optimally placed in September contains 19 objects. At least a few of them will be new to some of you. The end of summer, brings earlier sunsets, cooler temperatures, and the end of monsoon clouds so maybe it's a good time to start working on the PN program. An 8-inch telescope should be sufficient to detect the planetary nebulae on the list. Larger scopes will provide you with better views of course. For many of these objects, a narrow band filter like the Lumicon OIII (oh-three) is a must.

As I did last month, I'm going to lump all of those objects that I would call "stellar" together and say just this about them: A good chart, a filter and a bit of practice will help you find and identify these tiny objects. These PNe have such tiny dimensions because A. they are extremely far away and thus appear very small in angular size, B. they are very young and since they have not had the time to expand to large sizes are physically small or C. Some combination of these two causes. Because they are so small, they appear star-like or have very tiny, almost un-noticeable disks. Seeing often complicates the identification of these small objects. Atmospheric scintillations can cause point sources (stars) to appear disk-like and it is hard to pick an actual small disk out from a field of poorly focused stars. A good chart can very often solve this problem, allowing you to precisely identify the object, but sometimes a filter is required. Because a narrow band filter preferentially passes the specific wavelength that these objects are brightest in while dimming all other light, they can make a planetary nebula seem to blink. Just pass the filter into and out of the light path and look for the object that seems to brighten. It's an illusion of course; everything is being dimmed by the filter, but the principal wavelength of light that the PN emits is being less dimmed than the continuous emission of the stars.

NGC 6884 (Cygnus), NGC 6879 (Sagitta), NGC 6881 (Cygnus), NGC 6886 (Sagitta), IC 4997 (Saggita), IC 5117 (Cygnus), and PK 086-8.1 aka Hu 1-2 (Cygnus) all qualify for the stellar moniker as does Pease 1. However, I think Pease 1 is interesting enough to deserve further mention.

What makes Pease 1 particularly noteworthy is its association with the great globular in Pegasus, M15. It is not for the faint of heart, and is a real challenge to find. It's listed as 15th magnitude, with a magnitude 14.9 central star. Given its 1 arc second diameter, its light is rather concentrated and therefore its "surface brightness" is more like 14.6. Still quite faint, but reachable. The real problem is that it is well hidden among the of stars in the distant globular. Even Stephen James O'Meara describes the planetary as "nearly impossible to detect in backyard scopes". I disagree. it IS detectable, with luck, perseverance, a filter, and a great chart. Doug Snyder's Planetary Nebula Home Page has detailed charts and observing reports located here:
http://www.blackskies.org/peasefc.htm

But let not your heart be troubled if you fail in detecting it - the PNe Program allows negative observations. My log index contains a great many negative attempts on this object, but also contains six successful observations going back to October 2001.

Our September list contains some of the most famous planetaries in the sky and none are more famous than M27, The Dumbbell Nebula in Vulpecula. Kenneth Glyn Jones begins his description of it with the declaration: "M27 is undoubtedly the finest of the planetary nebulae in the whole heavens." Many would agree. M27 adorns the Planetary Nebula Program pin. It is easy to find, and unmistakable in the eyepiece. It was the first of its class to be discovered (Messier in 1764) and is often one of the first objects tracked down by novice observers. I doubt anyone here hasn't seen it, but if it is yet to tickle your retina you are in for a real treat.

NGC 6891 in Delphinus is a bright bluish-green disk, with a visible central star. High magnification and a filter will reveal a dim outer halo.

NGC 6894 in Cygnus is, with good seeing and sufficient aperture, clearly annular; otherwise it appears as a disk that is slightly elongated along the N-S axis.

NGC 6905 is known as the "Blue Flash Nebula" and I have no idea why. John H. Mallas may have initiated the moniker in 1963. Greg Crinklaw opines that it stems from Mallas's description of the pretty blue object twinkling and flashing among the backdrop of stars. It presents a pleasing view nestled in a rich star field and is framed by a tight triangle of stars. The disk is a bit elongated and you can see the central star.

I first observed Cygnus planetary NGC 7008 in October 1999 and it quickly became a favorite. A few years later, Eric Honeycutt would describe the object as "The Fetus Nebula" and the nickname has caught on. What a marvelous object! A kidney bean shaped dual lobbed disk of irregular brightness, with two brighter knots in the NE and two stars of magnitude 13 and 14 superimposed. The central star is visible in the dark area directly south of the NE lobe.

NGC 7009 in Aquarius is known as the Saturn Nebula. Lord Rosse (William Parsons) is the source of the name. It is famous for another naming too - Sir William Herschel described it as 'planetary' because it was round and bore magnification well. The term "planetary nebula" now applied to this class of object stems from that description. 7009 is one of the better examples of an object with "ansae"; literally "handles" : they are extensions that protrude from the main body of the planetary. This is what gives it the Saturn-like appearance. The object is large and bright, pale green or bluish and elongated E-W. Magnification improves the detection of the spike-like extensions which are probably fast moving jets of expelled material.

NGC 7026 in Cygnus was nicknamed the "Cheeseburger Nebula" by Jay McNeil. A dark linear feature divides a round disk evoking the image of a burger on a bun. I have suspected the central star as an occasional twinkle. It has a bi-polar halo as well.

NGC 7027 is also in Cygnus and it seems that I observe this in tandem with 7026 about as often as I view M65 and M66 together. They just seem to go together. At low power this object is distinctly green. Kent Wallace has suggested the nicknames "Green Rectangle" and "Magic Carpet". At higher powers the nebula is more blue to my eye. There is a very faint outer shell visible with a filter.

Sh 1-89 in Cygnus is our most ghostly and ethereal September offering. A filter is a must and it needs low power. The wings extending from this almost round cloud earn it the "Moth nebula" nickname.

NGC 7048 also in Cygnus is a more typical planetary nebula. Elongated N-S and annular . There is a faint star involved to the west and the nebula appears brighter there. The central star is not visible.

Our final September target is in Pegasus. NGC 7094 is a faint disk of uniform brightness surrounding a visible central star. There is a fainter star involved to the NE as well.

Objects for September

M 27	Dumbbell	Vul	20h00m03.2s	+22°44'52"
NGC 6884	PN G082.1+07.0	Cyg	20h10m44.0s	+46°29'21"
NGC 6879	He 2-455	Sge	20h10m54.9s	+16°57'05"
NGC 6881	He 2-456	Cyg	20h11m15.8s	+37°26'24"
NGC 6886	He 2-458	Sge	20h13m10.4s	+20°01'08"
NGC 6891	PN G054.1-12.1	Del	20h15m37.9s	+12°44'03"
NGC 6894	PN G069.4-02.6	Cyg	20h16m49.2s	+30°35'40"
IC 4997	He 2-464	Sge	20h20m37.0s	+16°45'45"
NGC 6905	He 2-466	Del	20h22m50.6s	+20°08'09"
NGC 7008	PN G093.4+05.4	Cyg	21h00m51.5s	+54°34'47"
NGC 7009	Saturn Nebula	Aqr	21h04m44.2s	-11°19'25"
NGC 7026	Cheeseburger Nebula	Cyg	21h06m40.0s	+47°53'21"
NGC 7027	PN G084.9-03.4	Cyg	21h07m25.2s	+42°16'26"
Sh1-89 moth	PK 089-0.1	Cyg	21h14m29.8s	+47°48'42"
NGC 7048	PN G088.7-01.6	Cyg	21h14m37.8s	+46°19'37"
Pease 1	PK 065-27.1	Peg	21h30m30.8s	+12°12'45"
IC 5117	PN G089.8-05.1	Cyg	21h32m54.8s	+44°38'18"
PN G086.5-08.8	PK 086-8.1	Cyg	21h33m33.3s	+39°40'40"
NGC 7094	K 1-19	Peg	21h37m22.5s	+12°49'57"

Good luck with these if you try for them this month. Please post here if you want to share your own impressions (past or present.) And don't forget to record the date, time and particulars of your observation in your logs. The complete list and the rules for the A.L. PN program can be found here:
http://www.astroleague.org/al/obsclubs/planetarynebula/planetneb1.html

Ted Forte

pace Place partners' article
Septmeber 2013

How to hunt for your very own supernova!

By Dr. Ethan Siegel

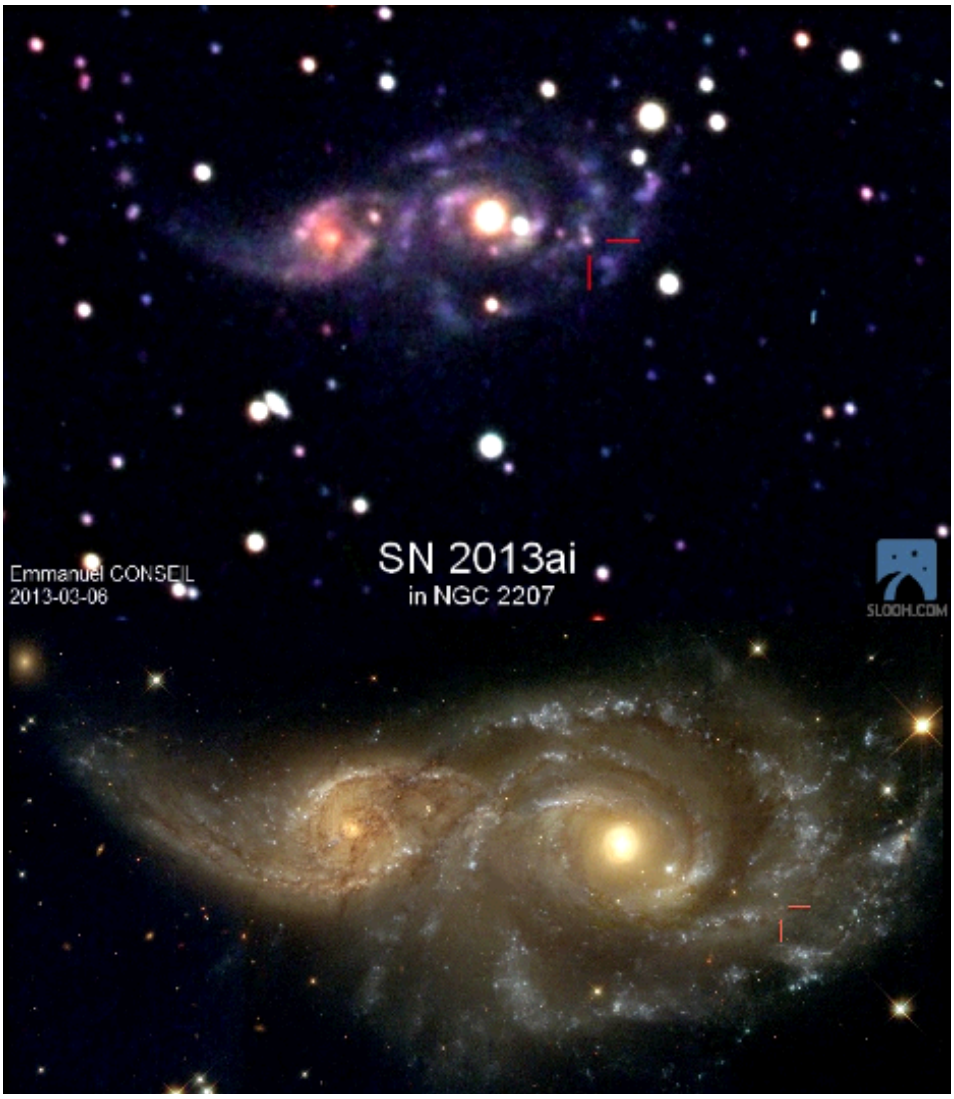
In our day-to-day lives, stars seem like the most fixed and unchanging of all the night sky objects. Shining relentlessly and constantly for billions of years, it's only the long-term motion of these individual nuclear furnaces and our own motion through the cosmos that results in the most minute, barely-perceptible changes.

Unless, that is, you're talking about a star reaching the end of its life. A star like our Sun will burn through all the hydrogen in its core after approximately 10 billion years, after which the core contracts and heats up, and the heavier element helium begins to fuse. About a quarter of all stars are massive enough that they'll reach this giant stage, but the *most* massive ones -- only about 0.1% of all stars -- will continue to fuse leaner elements past carbon, oxygen, neon, magnesium, silicon, sulphur and all the way up to iron, cobalt, and, nickel in their core. For the rare ultra-massive stars that make it this far, their cores become so massive that they're unstable against gravitational collapse. When they run out of fuel, the core implodes.

The inrushing matter approaches the center of the star, then rebounds and bounces outwards, creating a shockwave that eventually causes what we see as a core-collapse supernova, the most common type of supernova in the Universe! These occur only a few times a century in most galaxies, but because it's the most massive, hottest, shortest-lived stars that create these core-collapse supernovae, we can increase our odds of finding one by watching the most actively star-forming galaxies very closely. Want to maximize your chances of finding one for yourself? Here's how.

Pick a galaxy in the process of a major merger, and get to know it. Learn where the foreground stars are, where the apparent bright spots are, what its distinctive features are. If a supernova occurs, it will appear first as a barely perceptible bright spot that wasn't there before, and it will quickly brighten over a few nights. If you find what appears to be a "new star" in one of these galaxies and it checks out, report it *immediately*; you just might have discovered a new supernova!

This is one of the few cutting-edge astronomical discoveries well-suited to amateurs; Australian Robert Evans holds the all-time record with 42 (and counting) original supernova discoveries. If you ever find one for yourself, you'll have seen an exploding star whose light traveled millions of light-years across the Universe right to you, and you'll be the *very first* person who's ever seen it!



SN 2013ai, via its discoverer, Emmanuel Conseil, taken with the Slooh.com robotic telescope just a few days after its emergence in NGC 2207 (top); NASA, ESA and the Hubble Heritage Team (STScI) of the same interacting galaxies prior to the supernova (bottom).

Read more about the evolution and ultimate fate of the stars in our universe: http://science.nasa.gov/astrophysics/focus-areas/how-do-stars-form-and-evolve/.

While you are out looking for supernovas, kids can have a blast finding constellations using the Space Place star finder: http://spaceplace.nasa.gov/starfinder/.

Observations of Comet ISON

Captured from the HACList

By Wayne (Mr. Galaxy)

After at least six attempts for the past few weeks in Arizona's indifferent monsoon weather, I finally and unequivocally found Comet ISON as a visual object in my 25-in Dobsonian. It's bright enough that I think it should be fairly readily seen in telescopes about half that size in similar climactic conditions.

This seems to have been a very difficult monsoon season for making observations of any sort, especially near the horizon. It hasn't really been raining but it has been humid. Most nights when I'm out trying to observe I can hear the condensing water running off the metal roofs into my water collection containers. Mosquitoes have been making observing conditions distracting and difficult. I tried to observe the comet on Wed/Thursday night but the clouds decided to roll in at about 2am and remain until dawn light. Last night (Thurs/Fri), it was the opposite, cloudy before midnight, then mostly clearing up the rest of the night. There was some distant lightning in the northeast and clouds threatening to roll in along the southeast horizon.

For my earlier observing sessions I had been making 1/2 degree wide finder charts using the POSS images from the STSCI website. Since the motion of the comet has been about 1/2 degree a day the chart size was a little inconvenient for multiple day tracking of the comet. Last night I finally decided to download a 1-degree wide finder chart (centered on 9h01m42s, +20deg34', the three brightest stars seen on it are of about 8th magnitude and are plotted on the U2000 charts, for those interested) and was able to plot the motion of the comet in 12 hour increments. The comet was found near the position I estimated for Sept 13.5 (when it's 4am here in AZ it's 1100 UT or about 1/2 way into the day). After locating the approximate field at around 3:45am I searched around the area for about 20 minutes and finally found a hazy spot that looked promising at 4:05am. I knew there was a faint galaxy (UGC?? - can someone identify it?) about 10arcmin to the west of the calculated position of the comet and it looks like the comet passed by the galaxy earlier in the day. I was able to observe that that galaxy (maybe magnitude 14 and about 1arcmin in apparent diameter) lies close east of a distinctive small, flat triangle of faint stars and knew by then that the additional fuzzy spot I found was really the comet. While the galaxy was roundish with a small brighter middle, the comet had pretty small, little brighter middle and appeared asymmetric with a general haziness (tail) to the west and its inner coma was about 2-3 times larger than the galaxy with the tail about twice again as large in extension.

The nail in the coffin was the fact that I could detect motion in the comet after observing it for about 40 minutes until about 4:45am when the zodiacal light, which enveloped Mars about 2-1/2 degrees to the south and reached up to about Jupiter, started to interfere. In that amount of time I was able to see a generally eastward movement of about 2 arcminutes, or about the comet coma's apparent diameter, with respect to several faint stars that I used as landmarks. The comet appeared to be about 1.5 magnitude brighter than the nearby galaxy, both of which I could fit in

the field of view of my telescope (at 200x gives about 20arcmin FOV). Although the sky was getting brighter, the fact that the comet was getting higher in the sky (out of the haze) made it easier to detect.

It's definitely worth trying for the comet over the weekend before the moon starts to interfere. Let's see how you do!

Digested information:

C/2012 S1 (ISON):
2013 Sep. 13.45 UT: m1=12.5, Dia.=2.5', DC=2/, 25-inch Reflector (200x).
[Maybe brighter than expected. Observed for 40 minutes and able to see westward motion.
Even under humid conditions it was possible to observe some extension of the faint outer coma to the west, under pretty clear sky and good seeing conditions.
Altitude: 15 deg. Some zodiacal light interference. Nearby field stars checked in DSS.].

(Mescal, AZ, US, 4000 foot elevation)

ICQ Format: (may not have all info correct)

2012S1 2013 09 13.45 S 12.5 25-in L 200 2.5 2/ ICQ
XX WPJOHNSON

By Glen Sanner

I have been asked to post this image of Comet ISON to the HAClist.
I took this stacked image of Comet ISON (C2012 S1) on the morning of Sept. 4th at 4:32AM with the 10" Newtonian Astrograph. It is a stack of 5 images all taken at ISO 3200 then cleaned up with Photoshop elements. The images were 93 seconds each using the AP 800 mount with no guiding. I had an accurate star chart to find the comet and manually get it in the finder. I took a couple of quick images to see if the comet was in the field and it was. After stacking and processing the images I checked NED for magnitudes of some of the stars in the field and I discovered that UGC 04592 appears as a faint fuzzy near the comet.

This galaxy according to NED is at mag. 14.9. Checking the USNO A2 on Aladin I got the magnitude of several stars in the field labeling only one that seemed closest to the brightness of the comet. If you notice the nucleus of ISON appears somewhat brighter, however that is due to a star (magnitude 16.3B-15.7R) that is in the background. I did not have time to look for the comet visually with the 10" Newtonian and the 18" was blocked by the wall of my observatory.

Comet ISON by Glen Sanner

By Ted Forte

I was able to view ISON again this morning. It was considerably easier than my last observation on 9/4/13. I could definitely detect elongation in a WNW direction with a faint extension (tail) of about 2-4 minutes. The coma was about 2 arc minutes or less in size and only very slightly brighter toward the center (DC 1 or DC 2). It is in the neighborhood of 12.5 to 13.0 magnitude by my estimation. I picked the comet up at 0425 MST and started losing contrast about 0500.

30" f/4.5 at 144x, 177x, 195x, 300x I thought 177x gave me the best contrast. Seeing 3 of 5 and transparency 3 of 5, (SQM averaged 21.52 at start if session). The zodiacal light was quite apparent. There was high humidity and a little dew.

Imagers should have recorded a faint satellite passing close to the comet around 0439 local. The faint galaxy PGC 25449 was also visible in the same low power field as ISON. An 8th magnitude star (HD 77515) was about 8 minutes NNE of the comet.

After leaving ISON, I had a remarkable view of Jupiter's GRS at 433x. The usual dawn improvement in seeing made the details on Jupiter particularly crisp and steady. My best view of Jupiter in quite some time.

By Alan H.

I was finally able to observe this object visually this morning. It wasn't easy: the moon, albeit a fairly thin crescent, was only 16 degrees away, and thus the background sky was still fairly bright in the comet's vicinity. The air was somewhat damp; we're still getting some monsoon activity in these parts, and I had to wait for a few clouds to clear the area.

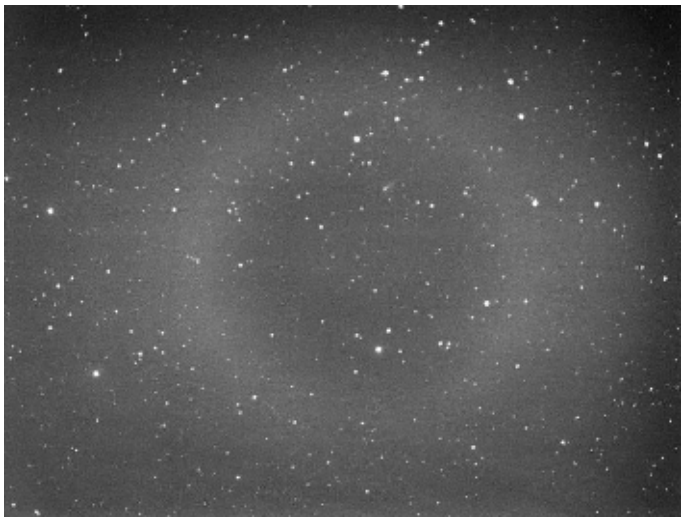
I have deliberately avoided reading any other visual reports so as not to bias my observation in any way. This is extinction corrected, and I've also tried to make some allowance for the bright background sky. If anything, this measurement is perhaps slightly generous.

September 1.47 UT, m1=13.1, coma 0.6' DC is difficult to evaluate, but perhaps around 4. Observation is with 41 cm reflector.

By David Roemer

Congrats everyone and Doug I finally saw your video, very nice.

Good to know this been picked up visually. I tried to see it this morning but I just could not say I saw it visually with my C-14 at F/11, so I quickly changed it over to Hyperstar with an SBIG STF-8300C and got a few shots before the sky became too bright. Here is one 60 second image dark subtracted in camera and no flat used (thus the ring). Also focus not the best but the comet is there. Look at the alignment to The Sky, nice. Looks to me to be around 12 magintude. Maybe a tad dimmer.



Comet ISON as seen with Hyperstar by David Roemer

Comet ISON by David Roemer

Book Review

Night has a Thousand Eyes: A Naked-Eye guide to the Sky, Its Science, and Lore

By Arthur Upgren

Cindy Lund

Night has a Thousand Eyes begins with an ode to twilight. Upgren explains that the changes that occur each day at dusk are very dramatic. The light intensity of the sky drops to 1/400000 of its brightness at sunset. The only events that rival it are dawn and a total solar eclipse. I really liked how he points out that something so common can be so extraordinary.

The next chapters describe the northern sky, the summer sky, the autumn sky, the winter sky, the spring sky and the southern sky respectively. In these chapters Upgren describes the stars and constellations for that season or region of the sky. Upgren also includes some information on the mythology of the stars and constellations including some non-western mythology, which was new to me. For example, in some Native American stories, the stars Altair and Vega are lovers separated by the Milky Way which passes between them.

Upgren explains how the sky has changed due to the precession of the equinoxes. The stars of autumn are moving to the north while the stars of spring are moving to the south. This is why the first magnitude star Fomalhaut plays such a small role in classic mythology. When the mythology was created Fomalhuat was so far south it could barely be seen in Athens and Rome. Precession has also moved to the celestial North Pole from Thuban to Polaris. I had known this already, but this book showed me that Thuban is between the Big and Little Dippers. Upgren showed that when Thuban was the pole star Cassiopeia and Cepheus were not circumpolar constellations. This is why, in mythology, they are instead associated with the nearby constellations Andromeda, Perseus and Pegasus.

The rest of Night has a Thousand Eyes discusses several different topics. The first is light pollution which is unsurprising since Upgren is a member of the International Dark-Sky Assocication. I was quite familiar with the problems caused by light pollution as well as ways to decrease it, but Upgren also wrote about how the sky changes as light increases beyond the natural light level. At the natural light level the sky is full of stars and the Milky Way can be seen to the horizon. At 1.1 times that natural level there may be some glow near the horizon towards a city. At twice the natural level, as is common in a small town, the Milky Way loses some detail and the limiting magnitude is reduced. At five times the natural level, like in a suburb, there are few faint stars near the horizon. At ten times the natural level the Milky Way can barely be seen and the sky is dull gray. At 25 times the natural level, as is common in cites only a few dozen stars are visible and these appear washed out.

The chapter I found most interesting is “What Ayla Saw”, which is about the proper motion of stars. (Ayla is the heroine of Jean Auel’s Clan of the Cave Bear book series.) If she lived 26,000 years ago, she would have seen Polaris as the North Star. The sky would appear much the same as it does now, but some constellations would be distorted due to the proper motions of the nearby stars. The stars Arcturus, Procyon and Sirius would have moved several degrees. After writing about how the sky looked in the past, Upgren turns to how the sky will look in the future, specifically how it will look in 802,701; the year H.G Wells’s time traveler went. H.G. Wells wrote that all the familiar constellations would be gone, but this isn’t quite true, for Orion will look much like it does today. This is because all of its stars, except Betelgeuse, are moving together. Orion’s shoulders will be much broader, but his belt and knees will have changed little. In fact, since Orion is made of bright, short lived stars travelling together, the familiar pattern of Orion may not cease to exist because its stars have moved out of place, but may instead continue until its stars have gone supernova and no longer shine.

Overall Night Has a Thousand Eyes is a fine book. It was a good read for me since I love astronomy but do not have a working telescope. I learned a lot of new ways to find the constellations and some interesting facts about the stars within them. Now I will be able to point out more stars and constellations at Public Astronomy Nights. I would recommend this book to anyone who wants to learn more about naked eye astronomy.

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How to contact the Nightfall editor, Cindy Lund:

Email: alund@juno.com
Phone 520-456-4817 Mail:
3666 Via El Soreno
Sierra Vista, AZ, 85650

2013—ARIZONA's Astronomically Handy Sky Calendar from Doug Snyder & the H.A.C.—2013

ARIZONA Observers SKY EVENTS Calendar for 2013 —All Times shown are MOUNTAIN STANDARD TIME*

January 2013

HIGHLITE1: Moon & Jupiter on 21st
HL2(month):**•Saturn's•Rings•open•to•18°**
Note: **HAC** = **H**uachuca **A**stronomy **C**lub

03 Th Quadrantids Meteor Shower - unfavorable year due to Moon light! 04 Fr ☾ Last Quarter Moon 2058 hrs.
11 Fr ● **NEW MOON** 1244 hrs.(lunation#1114)
12 Sa **HAC** Member **S**tar **P**arty (S.P.)
17 Th **HAC** Pub. S.P.;P.O.; SS@1743h.
18 Fr ☽ First Quarter Moon 1645 hrs.
21 Mo MOON & Jupiter v. close, 2000h
25 Fr **HAC Meeting**, Cochise College, 1900 hrs
26 Sa ○ Full Moon, 2138 hrs.
29 Tu Zodiacal Lt. in W., pm, next two weeks after evening twilight.

February 2013

HIGHLITE: Merc. & Mars close on Feb. 8th

03 Su ☾ Last Quarter Moon 0656 hrs.
09 Sa **HAC** Member **S**tar **P**arty (S.P.)
10 Su ● **NEW MOON** 0020 hrs.
14 Th **HAC** Pub. S.P.; P.O.; SS@1808hrs. 15 Fr **NEA** 2012 DA14; to mag.12 in evening hrs.; size= 57meters; visit spaceweather.com
16 Sa Merc.•evening•planet•in•W.,•7"
17 Su ☽ First Quarter Moon 1331 hrs. 22 Fr **HAC Meeting,** Cochise College
25 Mo ○ Full Moon 1326 hrs.
27 We Zodiacal Lt. in W., pm, next two weeks after evening twilight

March 2013

HIGHLITE: Messier Marathon S.P. 04 Mo ☾ Last Quarter Moon 1453 hrs. 09 Sa **HAC Messier Marathon S.P.**
09 Sa **Comet Pan-Starrs** (C/2011 L4); 2100hrs, at Perihelion—Mag. 0?
11 Mo ● **NEW MOON** 1251 hrs.
14 Th **HAC** Pub. S.P.; P.O.; SS@1829h.
16 Sa **KartchnerCavernsStatePark**SP.
17 Su Moon&Jup. close;1900hrs; 1.4°
19 Tu ☽ First Quarter Moon 1027 hrs.
20 We **Vernal Equinox**, 0402 hrs.
22 Fr **HAC Meeting,** Cochise College
27 We ○ Full Moon 0227 hrs.
31 Su• Merc.•morning•planet•in•E.•size•9" Easter Sunday

April 2013

HIGHLITE: Saturn Opposition, 4/28
HL2: Comet Pan-Starrs (early in month & bright?)

02 Tu ☾ Last Quarter Moon, 2137 hrs. 06 Sa **HAC** Member S.P.
10 We ● **NEW MOON** 0235 hrs.
14 Su Jupiter within 4° of crescent Moon
18 Th ☽ First Quarter Moon 0531 hrs. Th **HAC** Pub. S.P.; P.O.; SS@1852h.
20 Sa **ASTRONOMY DAY—Global**
22 Mo Lyrid Meteors—v. unfavorable due to moonlight; peak 0400?
25 Th ○ Full Moon, 1257 hrs.
26 Fr **HAC Meeting,** Cochise College
28 Su Saturn at **Opposition,** 0100 hrs. mag.•+0.1,•size•18.8",•8.82•AU

May 2013

HIGHLITE: Merc., Venus, Jup. Conjunction! 02 Th ☾ Last Quarter Moon, 0414 hrs.
05 & 06 Su & Mo **η Aquarid Meteors**; favorable; pk@4am each morning; possibly 40 per hr.
09 Th ● **NEW MOON** 1728 hrs.
11 Sa **HAC** Member S.P.
16 Th **HAC** Pub. S.P.; P.O.; SS@1912hrs.
17 Fr ☽ First Quarter Moon 2134 hrs.
24 Fr ○ Full Moon, 2125 hrs. very shallow penumbral Lunar Eclipse, 1.5%; mostly undetectable, starts at 2053hrs.
24 Fr **HAC Meeting,** Cochise College
24-29 Planetary Conjunction, **best** of 2013;evening twilight line up of Merc.,Venus,Jup.;26th is !!
31 Fr ☾ Last Quarter Moon, 1158 hrs.

June 2013

HIGHLITE: [redacted](Gamma) Delphinids?

04 Tu Venus in **M35**, pm, low in NW
08 Sa ● **NEW MOON** 0856 hrs. **HAC** Member S.P.
11 Tu **Meteors-[redacted]**el.; 0100-dawn? v. favorable year, activity is ??
12 We Merc. G. Elong. 24°, pm planet
13 Th **HAC** Pub. S.P.; P.O.; SS@1927hrs.
16 Su ☽ First Quarter Moon 1024 hrs. 20 Th Merc. 2° S. of Venus, pm
20 Th Summer **Solstice** 2204 hrs. 23 Su ○ Full Moon,0432h.largest of 2013 28 Fr **HAC Meeting,** Cochise College
29 Sa ☾ Last Quarter Moon, 2153 hrs.

July 2013

HIGHLITE: Mars, Jup., Merc., am, E., July **22nd**

01 Mo Pluto at Opposition,1800 hrs.
06 Fr Moon/Mars close; . low in E.,0430h.
08 Mo ● **NEW MOON** 0014 hrs.
15 Mo ☽ First Quarter Moon 2018 hrs.
22 Mo ○ Full Moon, 1116 hrs.
26 Fr **HAC Meeting,** Cochise College
29 Mo ☾ Last Quarter Moon, 1043 hrs.
29-30 Mo-Tu: **Meteors:** Delta(δ)Aquarids; am hrs.; favorable year

August 2013

HIGHLITE1: Perseid Meteor Shower
HL2: Moon/Planet pairings, am! & pm during month

06 Tu ● **NEW MOON** 1451 hrs
11-13 Su-Tu; **Perseids**; Pk. am of 12th; fast, bright
14 We ☽ First Quarter Moon 0356 hrs.
20 Tu ○ Full Moon, 1845 hrs.
23 Fr **HAC Meeting,** Cochise College
26 Mo **Neptune** at Opposition, 1900 hrs.
28 We ☾ Last Quarter Moon, 0235 hrs.

September 2013

HIGHLITE: Moon&Venus close, pm, 8th

03 Tu Zodiacal Lt. in E., am, next two weeks before twilight.
05 Th ● **NEW MOON** 0436 hrs.
12 Th ☽ First Quarter Moon 1008 hrs. **HAC** Public S.P., P.O.;SS@1830hrs.
19 Th ○ Full Moon (Harvest), 0413 hrs.
22 Su Fall **Equinox**,1344 h. (Aurora?)
26 Th ☾ Last Quarter Moon, 2055 hrs.
27 Fr **HAC Meeting,** Cochise College

October 2013

HIGHLITE: Jup. Dbl Shadow Transits (3) 17th, 18th, 26th; details online

03 Th Zodiacal Lt. in E.,am, next two wks. **Uranus** at Opposition, 0700 hrs.
04 Fr ● **NEW MOON** 1734 hrs. **HAC** Member S.P.
05 Sa **Kartchner Caverns StatePark** S.P.
10 Th **HAC** Public S.P., P.O.;SS@1755hrs.
11 Fr ☽ First Quarter Moon 0402 hrs.
12 Sa **Astronomy Day** (Autumn)
18 Fr ○ Full Moon,1638h.; Lunar eclipse @MR
25 Fr **HAC Meeting,** Cochise College
26 Sa ☾ Last Quarter Moon, 1640 hrs.

November 2013

HIGHLITE: Comet ISON (C/2012 S1) !!!! ??? 01 Fr Venus G. Elong. E.(47°),0100hrs., **pm** planet
02 Sa **HAC** Member S.P. Jup., dbl. Shadow Tr., 0414hrs., I & Eu;
03 Su ● **NEW MOON** 0550 hrs.
05 Tu S. Taurid meteors Pk., 0400 hrs.; favorable;
07 Th **HAC** Public S.P., P.O.; SS@1727 hrs.
09 Sa ☽ First Quarter Moon 2257 hrs.
17 Su ○ Full Moon, 0816 hrs.; Merc. **am** planet 22 Fr **HAC Meeting,** Cochise College
25 Mo ☾ Last Quarter Moon, 1228 hrs.
28 Th **Comet ISON**, **Perihelion** @ 1600hrs.
30 Sa **HAC** Member S.P. (for **December**)

December 2013

HIGHLITE: Comet ISON ??? !!!!

02 Mo ● **NEW MOON** 1722 hrs.
06 Fr Venus@greatest illumination, mag. -4.9,•26%•illuminated,•size•41" 09 Mo ☽ First Quarter Moon 1008 hrs. 12 Th **HAC** Public S.P., P.O.;SS@1714h. 13 Fr Geminid Meteors Pk. 2300h., fair? 14 Sa **HAC Meeting/XMAS Party** 17 Tu○ Full Moon,0413h.(smallest 2013)
21 Sa Winter **Solstice,** 1011 hrs.
22 Su Ursid Meteors Pk., 0700 hrs.
25 We ☾ Last Quarter Moon, 0648 hrs.
26 Th **C/ISON:** closest to Earth, 0300h.

*Times/Dates= ARIZONA Mountain Standard Time (NO DST; UT-7hrs); **updates/ details,** see: www.hacastronomy.com or http://skycalendar.blackskies.org;
Abbr: Tr=Transit; Pk=Peak; Merc=Mercury; E=East W=West; S=South; N=North; J, Jup.=Jupiter; V=Venus; v. = very; "=arc seconds; SS=SunSet; S.P.=Star Party; h., hrs.=hours (24 hour time system); MP=Minor Planet; MS=Moon Set; MR=Moon Rise; wks=weeks; Lt=Light; pm=evening; @=at; Pub.=Public ; NEA= **N**ear **E**arth **A**steroid; am=morning; mag.=magnitude; **meteor dates reflect predicted Peak Morning, but Moon may still be present; P.O.=Patterson Observatory; ; I=Io; Eu=Europa; G=Ganymede; C=Callisto; UT=Universal Time; **bold text=**possibly a promising/worthy event, activity or object; G_Elong=Greatest Elongation; dbl= double; AU=Astronomical Unit; °= degrees; *compiler*: **Doug Snyder** (C/2002 E2, MP15512); V1.1.2013