



FROM NIGHT VISIONS

DECEMBER 2010

Next Meeting: Monday, December 6
Observatory Christmas Party: 7 p.m.

This will be a potluck event so please bring a side dish or a desert. The club will provide tableware, drinks, ice and a meat cold cut dish. Please plan to arrive early (about 6:30) so we can get everything set up and start at 7:00pm. Call the Observatory at 768-9948 if you have any questions. Make plans now to attend! See you there!

Program

Food, and music
Keep looking up!
Craig, Ed.



President's Message—December Newsletter

Another year is quickly coming to an end and we still see the same star patterns in the sky that we saw there last year, namely the great ORION, TAURUS, the PLEIDES, etc. Except for the cold weather, this is one of the best viewing seasons of the year and 2010 is turning out to be fantastic. If you wrap up to stay warm, you cannot beat the winter sky.

I recall reading of Leslie Peltier in his book *Starlight Nights* of how he would wrap up to stay warm in the Ohio winter of the 1920's as he looked at the sky from his homemade observatory in his father's pasture. If he could wrap up to stay warm to use the technology available back then, we can surely find a way to stay warm today with everything we have to work with.

Right now, Orion is making its entrance over the trees in the East and opening to us its beauty of the GREAT ORION NEBULA, the belt stars and the oversized Red Giant of Betelgeuse.

JUPITER has been giving us a good show for several months and its moons have been dancing in the heavens to everyone's thrill. It is always interesting to see the different positions that the Galilean moons are in and to think that we are seeing the same thing that Galileo saw—only in much more detail and grandeur. No matter what time of year we are observing, we can always see something that Galileo found, whether it be the Galilean moons, the rings of Saturn, the phases of Venus or the mountains of the Moon, his work still gets "oohs" and "aahs" from the viewers.

This administration has stressed the continued need for various projects for the members to participate in. At our last meeting in November, we talked about all of the observing projects or "clubs" offered by the Astronomical League. If any members want to pursue a certificate of accomplishment from the League, BRAS will pay the bill for any of the League's materials to help you gain that certificate. The materials will simply be added to the supply of BRAS publications available for all members.

We are approaching the 30th year in 2011 since BRAS was founded in 1981. It started with a few people at the Idlewild observatory at Clinton and continued to its beginnings at the EBR Library for its first meetings. Considering that it was just a few people with some neat ideas in their mind, we must all agree that it has developed into quite an organization. Although we cannot take full credit for HRPO, I think it is clear that without BRAS's encouragement and support, HRPO would either not be here or not be the quality facility that it has grown to be. If you see one of the "old timers" from the early days, be sure to tell them thank you for helping us get started. The currently active members that were instrumental in getting BRAS started were Craig Brenden, Wally Purcell, Donald Brock and Bob Sinitiere. Within a few years of the initial beginnings, Merrill Hess joined BRAS and can be considered one of the early "old timers" as well.

Thanks to those who help to get BRAS started and for keeping it going for 30 years.....

I look forward to seeing all of the membership at our Christmas party on Monday, December 6.



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MEETING NOTES FROM THE VP

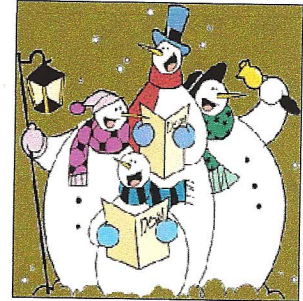
Hey Everyone,

Our meeting in November was great! We had some nice pictures and great accounts of the Deep South Regional Stargaze. By Wally's census, we had around 22 members present at various times during the event accounting for about 20% of the total attendance. Not a bad showing from our club! I had a great time up there and can't recommend these star parties enough. It's a great time getting out to a nice dark sky and seeing so many friendly people and all the wonderful equipment set up all over the place. If you've never been to one, keep the Rockefeller Retreat and Hodges Gardens in mind. We should be hearing a bit more about Rockefeller at this month's meeting and you can get more information on Hodges Gardens at our website. Remember, this month's meeting is being held a week early to prevent a conflict with the HRPO being open to the public for the meteor shower. It will be Monday, December 6th at 7PM. HRPO, as usual.

It is our annual end-of-the-year Christmas party and pot luck dinner. Bring some food and help eat some, too! My wonderful wife has once again consented (a.k.a. been tricked) to provide some music on her harp while we eat and socialize. We are also fielding any additional nominations for officers and voting for said officer positions for the next year.

Hope to see you all there! (And not just because that means MORE FOOD!)

Ben Toman
BRAS VP



B.R.A.S. MEETING NOTES 11-7-'10

7:15 Start Pres. Marvin Owen - starts Intros from all attending.

New members Jeff, Greg, Lisa.

A lot of bits & parts were pre-pulled out of the BRAS closet for recycle & disposal at end of meeting.

Merrell reports Karen Taylor sent a letter after the Deep South Star Party saying she & family enjoyed it & became excited about it.

The 1st Monday, Dec. 6th, is the eating meeting. Moved due to next Monday's meteor shower. The starting late Monday night, 20/21 of Dec. is a Lunar Eclipse.

This is also the Officer's Election Meeting. Nominations are still open.

So far we have for President - Marvin Owen, Vice Pres. - Ben Toman,
Secretary- Dave Thomas or Charles Edwards, Treasurer-Bob Sinitiere

Ben mentioned Astronomical League projects of interest & availability. Trevor mentioned a Messier Marathon plan, & Chris submitted his Lunar Club Observations for credit to the League. Future projects include "Dark Skys & Constellations" & "Ghost Hunt Challenge".

Don Weinell - Jan.28th thru 30th Rockefeller trip is \$10 per adult a night.

P.A.S. 22 B.R.A.S. members attended Deep South Gaze. Next year they are going to stress "This isn't an Outreach Program". They don't want casual visitors that don't control their light pollution. It is on Oct. 26th--30th of 2011. Pictures of the event for our website would be appreciated. Ben had some. Also, we need the URL for the gaze sign-up next year.

Craig is in Washington State for his Dad.

The program Friday night, Nov. 11th, is "Buying your 1ST 'SCOPE, & volunteers are needed.

Corry has offered to park his 14" Meade out here for our use. Thank You, Corry.

1st Annual Award for Excellence in Astronomy Science is in the works.

Art is gathering ideas on procedure for putting displays on B.R.A.S. TV.

4" Meade for sale-see Wally (Mary's 'scope)

8:25 Close meeting Dave Thomas-Secretary

MESSAGE FROM HRPO

Mike Carambat has been catching some amazing fireballs with his new all-sky camera. His just-registered URL (www.oakgroveobservatory.com) has the footage on its front page. The American Meteor Society does state a live viewer will see a fireball of at least -4 magnitude for every cumulative total of twenty hours spent looking.

Trevor McGuire (with some patrons) saw two fireballs about forty-five minutes apart at HRPO while operating the 12" Dob the night of the 20th. New member Geoff Michelli saw the second one.

I know this sounds early, but I start the arrangements for International Astronomy Day six months ahead of time. The 2011 IAD will be Saturday, 7 May from 3pm to 11pm. Please start thinking about whether you will be able to devote two to four hours on site. The 2010 event saw 788 visitors; we're looking at possibly 1000 visitors this go-round!

Christopher

CALL FOR VOLUNTEERS: ON-SITE

Geminid Meteor Shower: Monday, 13 December from 9pm to 1am.
One volunteer for two hours. As a floater/greeter.

Evening Sky Viewing: Saturdays from 6pm to 9pm or 7pm to 10pm.

One or two volunteers. To staff marshmallow roast, work simple 6" Dob, demonstrate air cannon, gyroscope, etc. All needed training given. NOTE: We really do not need volunteers on Friday nights. NOTE: Volunteer does not have to come every Saturday night.

HRPO FRIDAY NIGHT LECTURE SERIES

*10 DECEMBER: "The Star of Bethlehem"

*17 DECEMBER: "The Mars Report"

*24 DECEMBER: *{closed}*

*31 DECEMBER: *{closed}*

*7 JANUARY: "2010—The Space Year in Review"

LANDOLT OBSERVATORY VIEWING

at Nicholson Hall

Saturday, 11 December from 6pm to 7pm

BRAS Observing Notes December

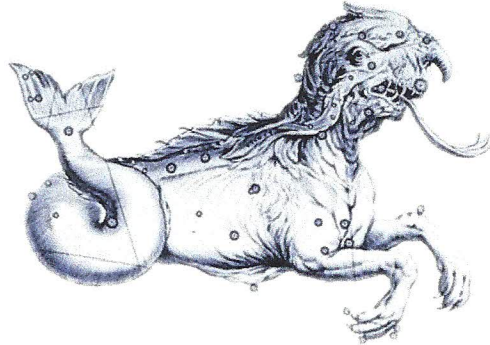
Constellation of the Month

Cetus: The Sea Monster

The story of the beautiful Andromeda and her boastful mother tells of a savage sea monster sent by a furious king Poseidon to teach the mortals a lesson about humility. It is this sea monster which appears in the heavens as the constellation Cetus.

Cetus is a strange and terrifying beast indeed. The Greeks pictured it as having large open jaws, the feet and legs of a land animal, skin like a fish and a huge coiled up tail like a serpent. Andromeda was offered up as a sacrifice to the monster and chained to a rock to await her fate. Like in all good stories however the hero slays the monster and gets the girl in the end.

Cetus contains the star Mira (Omicron Ceti), which is the first variable star to be discovered. It is a red giant which oscillates in brightness over a period of 332 days between a high of magnitude 2 and a low of magnitude 10.1. Mira is the brightest variable star in the sky that is not visible to the naked eye during some part of its cycle. It is currently at about magnitude 3.2 and visible in the early evening.



Sky Chart

Position in the Sky

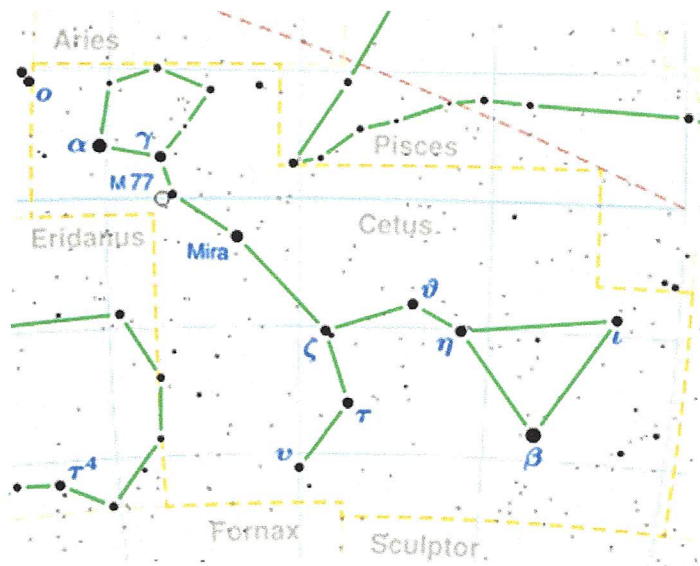
Right Ascension: 2 hours
Declination: -10 degrees

Named Stars

MENKAR (Alpha Cet)
DIPHDA (Beta Cet)
Kaffaljdhma (Gamma Cet)
Baten Kaitos (Zeta Cet)
Dheneb (Eta Cet)
Deneb Kaitos Shemali (Iota Cet)
Menkar (Lambda Cet)
MIRA (Omicron Cet)

Messier Objects

M77 (spiral galaxy)



BRAS Dark Sky Site Viewing Dates

December 4th and 11th 2010 / January 1st and 8th 2011

For more information check out the BRAS website at <http://www.brastro.org>

Art Barrios
BRAS Observing Chairman
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The Evening Sky Map

FREE* EACH MONTH FOR YOU TO EXPLORE, LEARN & ENJOY THE NIGHT SKY

WWW.SKYPAPPS.COM
The Geminid meteor shower peaks on the morning sky around December 14. This is a splendid shower of often bright, medium-speed meteors. Orion, the Hunter, is the brightest constellation in the winter sky. The 3 vertical stars make up his belt.

NORTHERN HEMISPHERE DECEMBER 2010

Sky Calendar - December 2010

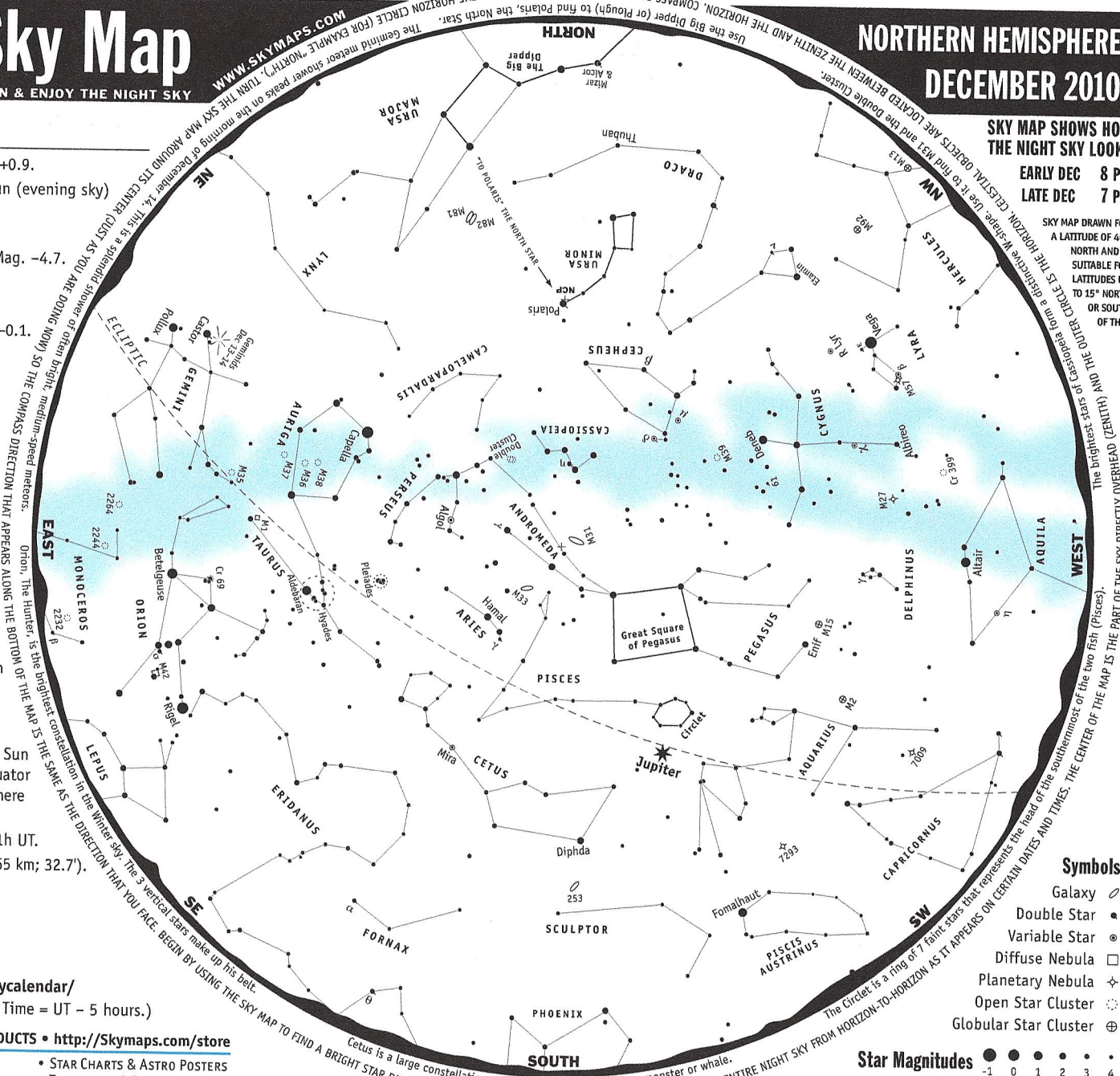
- 1 Moon near Saturn (morning sky) at 13h UT. Mag. +0.9.
- 1 Mercury at greatest elongation, 22° east from Sun (evening sky) at 16h UT. Mag. -0.4.
- 2 Moon near Spica (morning sky) at 3h UT.
- 2 Venus at its brightest at 11h UT (morning sky). Mag. -4.7.
- 2 Moon near Venus at 18h UT (morning sky).
- 5 New Moon at 17:36 UT. Start of lunation 1088.
- 7 Moon near Mercury at 7h UT (19° from Sun). Mag. -0.1.
- 13 Moon at apogee (farthest from Earth) at 9h UT (distance 404,406 km; angular size 29.3').
- 13 First Quarter Moon at 13:59 UT.
- 13 Moon near Jupiter at 21h UT. Mag. -2.5.
- 14 Geminid Meteor Shower peaks at 11h UT. Produces bright, medium-speed meteors. Very favorable viewing conditions this year.
- 19 Moon near Aldebaran (evening sky) at 23h UT.
- 20 Mercury at inferior conjunction with the Sun at 1h UT. Mercury passes into the morning sky.
- 21 Full Moon at 8:13 UT.
- 21 Total Eclipse of the Moon begins at 7:41 UT and ends at 8:53 UT. Mid-eclipse at 8:17 UT. Partial phases begin at 6:33 UT and end at 10:01 UT. Moon will appear red-orange in color during totality (the Earth's shadow). Entire eclipse visible from North America, and eastern Pacific Ocean.
- 21 December solstice at 23:43 UT. The time when the Sun reaches the point farthest south of the celestial equator marking the start of winter in the Northern Hemisphere and summer in the Southern Hemisphere.
- 24 Moon near Beehive cluster M44 (morning sky) at 1h UT.
- 25 Moon at perigee (closest to Earth) at 12h UT (368,465 km; 32.7').
- 25 Moon near Regulus (morning sky) at 16h UT.
- 28 Last Quarter Moon at 4:18 UT.
- 29 Moon near Spica (morning sky) at 10h UT.
- 31 Moon near Venus at 15h UT (morning sky).

More sky events and links at <http://Skymaps.com/skycalendar/>
All times in Universal Time (UT). (USA Eastern Standard Time = UT - 5 hours.)



SAVE ON RECOMMENDED PRODUCTS • <http://Skymaps.com/store>

- STAR ATLASES & PLANISPHERES
 - STAR CHARTS & ASTRO POSTERS
 - BOOKS FOR SKY WATCHERS
 - TELESCOPES & BINOCULARS
- All sales support the production and free distribution of The Evening Sky Map.



SKY MAP SHOWS HOW THE NIGHT SKY LOOKS
EARLY DEC 8 PM
LATE DEC 7 PM

SKY MAP DRAWN FOR A LATITUDE OF 40° NORTH AND IS SUITABLE FOR LATITUDES UP TO 15° SOUTH OR SOUTH OF THIS

Symbols

- Galaxy ☾
- Double Star ●●
- Variable Star ●
- Diffuse Nebula □
- Planetary Nebula ◇
- Open Star Cluster ○
- Globular Star Cluster ⊕

Star Magnitudes ●●●●●●●●●●
-1 0 1 2 3 4

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INSTRUCTIONS: THE SKY MAP SHOWS THE ENTIRE NIGHT SKY FROM HORIZON-TO-HORIZON AS IT APPEARS ON CERTAIN DATES AND TIMES. THE CENTER OF THE MAP IS THE PART OF THE SKY DIRECTLY OVERHEAD (ZENITH) AND THE OUTER CIRCLE IS THE HORIZON. CELESTIAL OBJECTS ARE LOCATED BETWEEN THE ZENITH AND THE HORIZON. COMPASS DIRECTIONS ARE INDICATED ALONG THE HORIZON CIRCLE (FOR EXAMPLE "NORTH").

Cetus is a large constellation that represents a mythical sea monster or whale. The Crictet is a ring of 7 faint stars that represents the head of the southernmost of the two fish (Pisces).

About the Celestial Objects

Listed on this page are several of the brighter, more interesting celestial objects visible in the evening sky this month (refer to the monthly sky map). The objects are grouped into three categories. Those that can be easily seen with the naked eye (that is, without optical aid), those easily seen with binoculars, and those requiring a telescope to be appreciated. **Note, all of the objects (except single stars) will appear more impressive when viewed through a telescope or very large binoculars.** They are grouped in this way to highlight objects that can be seen using the optical equipment that may be available to the star gazer.

Tips for Observing the Night Sky

When observing the night sky, and in particular deep-sky objects such as star clusters, nebulae, and galaxies, it's always best to observe from a dark location. Avoid direct light from street lights and other sources. If possible observe from a dark location away from the light pollution that surrounds many of today's large cities.

You will see more stars after your eyes adapt to the darkness—usually about 10 to 20 minutes after you go outside. Also, if you need to use a torch to view the sky map, cover the light bulb with red cellophane. This will preserve your dark vision.

Finally, even though the Moon is one of the most stunning objects to view through a telescope, its light is so bright that it brightens the sky and makes many of the fainter objects very difficult to see. So try to observe the evening sky on moonless nights around either New Moon or Last Quarter.

Astronomical Glossary

Conjunction – An alignment of two celestial bodies such that they present the least angular separation as viewed from Earth.

Constellation – A defined area of the sky containing a star pattern.

Diffuse Nebula – A cloud of gas illuminated by nearby stars.

Double Star – Two stars that appear close to each other in the sky; either linked by gravity so that they orbit each other (binary star) or lying at different distances from Earth (optical double). Apparent separation of stars is given in seconds of arc (").

Ecliptic – The path of the Sun's center on the celestial sphere as seen from Earth.

Elongation – The angular separation of two celestial bodies. For Mercury and Venus the greatest elongation occurs when they are at their most angular distance from the Sun as viewed from Earth.

Galaxy – A mass of up to several billion stars held together by gravity.

Globular Star Cluster – A ball-shaped group of several thousand old stars.

Light Year (ly) – The distance a beam of light travels at 300,000 km/sec in one year.

Magnitude – The brightness of a celestial object as it appears in the sky.

Open Star Cluster – A group of tens or hundreds of relatively young stars.

Opposition – When a celestial body is opposite the Sun in the sky.

Planetary Nebula – The remnants of a shell of gas blown off by a star.

Universal Time (UT) – A time system used by astronomers. Also known as Greenwich Mean Time. USA Eastern Standard Time (for example, New York) is 5 hours behind UT.

Variable Star – A star that changes brightness over a period of time.

NORTHERN HEMISPHERE DECEMBER 2010 CELESTIAL OBJECTS Sky maps .com

Easily Seen with the Naked Eye

Altair	Aql	• Brightest star in Aquila. Name means "the flying eagle". Dist=16.7 ly.
Capella	Aur	• The 6th brightest star. Appears yellowish in color. Spectroscopic binary. Dist=42 ly.
δ Cephei	Cep	• Cepheid prototype. Mag varies between 3.5 & 4.4 over 5.366 days. Mag 6 companion.
Deneb	Cyg	• Brightest star in Cygnus. One of the greatest known supergiants. Dist=1,400±200 ly.
Castor	Gem	• Multiple star system with 6 components. 3 stars visible in telescope. Dist=52 ly.
Pollux	Gem	• With Castor, the twin sons of Leda in classical mythology. Dist=34 ly.
Vega	Lyr	• The 5th brightest star in the sky. A blue-white star. Dist=25.0 ly.
Rigel	Ori	• The brightest star in Orion. Blue supergiant star with mag 7 companion. Dist=770 ly.
Betelgeuse	Ori	• One of the largest red supergiant stars known. Diameter=300 times that of Sun. Dist=430 ly.
Algol	Per	• Famous eclipsing binary star. Magnitude varies between 2.1 & 3.4 over 2.867 days.
Fomalhaut	PsA	• Brightest star in Piscis Austrinus. In Arabic the "fish's mouth". Dist=25 ly.
Pleiades	Tau	• The Seven Sisters. Spectacular cluster. Many more stars visible in binoculars. Dist=399 ly.
Hyades	Tau	• Large V-shaped star cluster. Binoculars reveal many more stars. Dist=152 ly.
Aldebaran	Tau	• Brightest star in Taurus. It is not associated with the Hyades star cluster. Dist=65 ly.
Polaris	UMi	• The North Pole Star. A telescope reveals an unrelated mag 8 companion star. Dist=433 ly.

Easily Seen with Binoculars

M31	And	• The Andromeda Galaxy. Most distant object visible to naked eye. Dist=2.5 million ly.
M2	Aqr	• Resembles a fuzzy star in binoculars.
η Aquilae	Aql	• Bright Cepheid variable. Mag varies between 3.6 & 4.5 over 7.166 days. Dist=1,200 ly.
M38	Aur	• Stars appear arranged in "pi" or cross shape. Dist=4,300 ly.
M36	Aur	• About half size of M38. Located in rich Milky Way star field. Dist=4,100 ly.
M37	Aur	• Very fine star cluster. Discovered by Messier in 1764. Dist=4,100 ly.
μ Cephei	Cep	• Herschel's Garnet Star. One of the reddest stars. Mag 3.4 to 5.1 over 730 days.
Mira	Cet	• Famous long period variable star. Mag varies between 3.0 & 10.1 over 332 days.
χ Cygni	Cyg	• Long period pulsating red giant. Magnitude varies between 3.3 & 14.2 over 407 days.
M39	Cyg	• May be visible to the naked eye under good conditions. Dist=900 ly.
ν Draconis	Dra	• Wide pair of white stars. One of the finest binocular pairs in the sky. Dist=100 ly.
M35	Gem	• Fine open cluster located near foot of the twin Castor. Dist=2,800 ly.
M92	Her	• Fainter and smaller than M13. Use a telescope to resolve its stars.
ε Lyrae	Lyr	• Famous Double Double. Binoculars show a double star. High power reveals each a double.
R Lyrae	Lyr	• Semi-regular variable. Magnitude varies between 3.9 & 5.0 over 46.0 days.
Cr 69	Ori	• Lambda Orionis Cluster. Dist=1,630 ly.
M42	Ori	• The Great Orion Nebula. Spectacular bright nebula. Best in telescope. Dist=1,300 light years.
M15	Per	• Only globular known to contain a planetary nebula (Mag 14, d=1"). Dist=30,000 ly.
Double Cluster	Per	• Double Cluster in Perseus. NGC 869 & 884. Excellent in binoculars. Dist=7,300 ly.
253	Scl	• Fine, large, cigar-shaped galaxy. Requires dark sky. Member of Sculptor group.
Cr 399	Vul	• Coathanger asterism or "Brocchi's Cluster". Not a true star cluster. Dist=218 to 1,140 ly.

Telescopic Objects

γ Andromedae	And	• Attractive double star. Bright orange star with mag 5 blue companion. Sep=9.8".
7009	Aqr	• Saturn Nebula. Requires 8-inch telescope to see Saturn-like appendages.
7293	Aqr	• Helix Nebula. Spans nearly 1/4 deg. Requires dark sky. Dist=300 ly.
γ Arietis	Ari	• Impressive looking double blue-white star. Visible in a small telescope. Sep=7.8".
η Cassiopeiae	Cas	• Yellow star mag 3.4 & orange star mag 7.5. Dist=19 ly. Orbit=480 years. Sep=12".
Albireo	Cyg	• Beautiful double star. Contrasting colours of orange and blue-green. Sep=34.4".
61 Cygni	Cyg	• Attractive double star. Mags 5.2 & 6.1 orange dwarfs. Dist=11.4 ly. Sep=28.4".
γ Delphini	Del	• Appear yellow & white. Mags 4.3 & 5.2. Dist=100 ly. Struve 2725 double in same field.
θ Eridani	Eri	• Striking blue-white double star. Mags 3.2 & 4.3. Visible in a small telescope. Sep=8.2".
β Lyrae	Lyr	• Eclipsing binary. Mag varies between 3.3 & 4.3 over 12.940 days. Fainter mag 7.2 blue star.
M57	Lyr	• Ring Nebula. Magnificent object. Smoke-ring shape. Dist=4,100 ly.
α Orionis	Ori	• Superb multiple star. 2 mag 7 stars one side, mag 9 star on other. Struve 761 triple in field.
M1	Tau	• Crab Nebula. Remnant from supernova which was visible in 1054. Dist=6,500 ly.
M33	Tri	• Fine face-on spiral galaxy. Requires a large aperture telescope. Dist=2.3 million ly.
M81	UMa	• Beautiful spiral galaxy visible with binoculars. Easy to see in a telescope.
M82	UMa	• Close to M81 but much fainter and smaller.
M27	Vul	• Dumbbell Nebula. Large, twin-lobed shape. Most spectacular planetary. Dist=975 ly.



November 2010

An Invitation to Present

The national conventions of the Astronomical League or ALCons (Astronomical League Convention) take place yearly at different locations around the country.

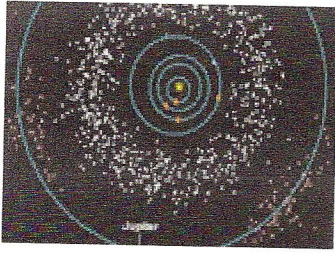
ALCON 2011 is unique in that it is the first time that the national gathering will focus on personal observing under very dark skies. It is also the first time that an ALCON convention will be held at a National Park, Bryce Canyon National Park in southern Utah to be exact. Bryce Canyon is known for some of the darkest skies in the lower 48 States.

We want to take advantage of amateur astronomers that have specialized knowledge and/or skills relating to personal observing that would be of interest to conference attendees. Some suggested topics are: 1) Use of filters. 2) Celestial mechanics. 3) Observing session tools and techniques. 4) CCD/Astrography. 5) Eyepiece design and uses. 6) Specific observing programs for double stars, galaxy clusters, planetary nebula, etc. 7) Maximizing GO-TO technology. 8) Observing programs outside the Messier Catalogue. 9) Planning with computer software. 9) Solar observing techniques 10) More ideas?

We invite participation from your club members to help with presentations and/or workshops at this convention as guest speakers. We have blocked out a limited number of 45-50 minute time segments during the days of the convention. We will have full access to any audio-visual equipment needed. If there is anyone interested in becoming involved, please email or write to let us know of your availability and requirements. We look forward to hearing from you!

Lowell Lyon, ALCON 2011 Co-Chair
bolide@sisna.com
www.astroleague.org

National Convention of the Astronomical League
June 29th – July 2nd, 2011
Bryce Canyon National Park, Utah



Missing Asteroids Reveal Planet-Sized Mystery

By Jeremy Hsu
Staff Writer

Missing asteroids in our solar system may be the handiwork of rampaging giant planets as they migrated to their current positions, according to a new computer simulation.

Scientists have known that planets such as Jupiter, Saturn, Uranus and Neptune migrated during the first several million years of early existence. The new simulation showed that the giant planets would have disturbed many asteroids as they fled the scene, leaving behind "footprints" that match the real-life patterns in the main asteroid belt.

"It really showed evidence that the footprints of planet migration are visible today in asteroid distribution," said David Minton, a planetary sciences researcher at the University of Arizona in Tucson.

Patterns of planet migration

Previous evidence has suggested that the giant planets once formed a more compact huddle. But their gravitational interactions with the then-larger Kuiper Belt, an icy region beyond Neptune filled with comet-like bodies, ended up fueling a migration.

"Each time the planets tossed these Kuiper Belt objects around, they would move a little," Minton told *SPACE.com*.

Jupiter ended up moving slightly closer to the sun, while the other giant planets moved farther apart from both the sun and each other. Minton and Renu Malhotra, another planetary scientist at the University of Arizona, wanted to examine possible aftereffects of that unstable period.

Gaps as evidence

They first looked at the current configuration of the main asteroid belt between Mars and Jupiter, which has remained largely stable for 4 billion years. Astronomers had discovered a series of gaps in the main belt known as Kirkwood gaps back in the 1860s. These unstable regions are relatively empty of asteroids because of Jupiter's and Saturn's current gravitational influence.

The researchers started their simulation with a uniform distribution of main belt asteroids larger than 30 miles (50 km) in diameter, but ended up with far more than what actually remains in real life. The simulated asteroid belt matched the real asteroid belt quite well on the sunward-facing sides of the Kirkwood gaps, but the real asteroid belt is largely devoid of asteroids on the Jupiter-facing sides.

That puzzle came together only when Minton and Malhotra ran other simulations which included the giant planet migration. The simulated asteroid patterns then matched up "surprisingly well" with the current main belt configuration, Minton said.

Collateral damage

Giant planets may have scarred our solar system in other ways. The inner system planets suffered a period of heavy bombardment around 3.9 billion years ago, which some scientists argue may have represented a spike in asteroid impacts rather than just the normal planetary formation chaos.

The new simulation may hint at the bombardment as being a collateral effect of the violent planet exodus, when main belt asteroids went zipping off like stray bullets.

"We can't say from this study when that migration happened, but it's a good plausible mechanism," Minton noted. "Once the asteroids get kicked out of the asteroid belt, they have to go somewhere. Earth, the moon and Mars are all great targets for these asteroids."

However, full closure on this case will have to wait for more evidence to turn up.

Telescopes for Sale

BRAS normally does not put member notes in the monthly newsletter regarding telescopes or equipment for sale. However, we are going to try it this month to see what response there is. Thus, here are two members with equipment for sale.

MEADE 4 ½" REFLECTING TELESCOPE

\$ 200

with ATS (Auto Star Tracking) 9 mm & 25 mm eyepieces, 2X Barlow, metal tripod, red dot viewfinder, DS Series. Like New. Meade instructional DVD, Auto Star software, Meade Astronomy, EXPERT Astronomer, SKYWATCH CDs.
Call Mary Vought 225-928-2820

ORION SKYQUEST 8" f/5 DOBSONIAN

\$ 250

Aluminum optical tube, 2" rack and pinion focuser, 9X50 finder, friction control springs, no counterweights, large thumbscrews for easy collimation of primary mirror, collimation of secondary mirror requires 2 mm Allen key-included.

With Protective padded case for optical tube, aluminum eyepiece case, 40mm 3" Optilux eyepiece, Epic ED2 1.25" eyepieces: 25mm, 18mm, 12.5mm nd 9.5 mm, 1.25" 3 element Barlow, collimation eyepiece, 2" broadband light pollution filter, 1.25" filters: red, green, blue and yellow color filters; broadband light pollution filter, variable polarizing filter.

Contact Alexander Templet at 985-438-0084 or alextemplet@gmail.com

Also for sale by Alex:

Orion GoScope 70mm f/5 refractor with 32mm, 25mm and 10mm Plossl eyepieces, collapsible tripod, EZFinder red-dot sight, backpack carrying case for \$50

Please check BRAS's web site at www.BRAstro.org for other items for sale and for comments and pictures about the great sky above.