# Star Gazer News

**Newsletter of the Delmarva Stargazers**
www.delmarvastargazers.org

## From the Prez….

Resolutions! We don't need no stinkin' resolutions!

There! Now we don't have to feel guilty about being a bit lax on implementing those pesky New Year's Resolutions. All we have to do is enjoy simple Star Gazing and the enjoyable eating that makes Star Gazing enjoyable. You IT folks will recognize this situation as a circular loop that cannot be evaluated by our computers. All of us will recognize the pounds around our mid section that results from eating too much due to the "enjoyable" circular loop.

We have an exciting year coming up. Our 10th Mid Atlantic Mirror Making workshop unfolds March 12 thru the 14th at Mallard Lodge. This is an excellent opportunity for anyone to learn the fine art of telescope mirror making and to make a mirror that can be enjoyed by the maker now and passed on to the next generation…a real family heirloom. BTW, if you intend to make a mirror during this session NOW is the time to REGISTER…see http://www.delmarvastargazers.org/archive/mw10/index.html for the registration form.

Delmarva Star Gaze XVI (number 16) will occur April 15-18 at the Equestrian Center. So, file your income tax returns early so you can use the refunds to buy those goodies everyone wants for the next star party.

Our next meeting will be on Groundhog Day, Feb 2, 2010 at Mallard Lodge. The main topic for the meeting will be a recap of Internet controlled telescopes (remotely controlled telescopes). The constellation will be Canis Major.

Please join us for the meeting and ask a Star Gazer to carpool with you…and bring a non- Star Gazer friend. See you there. Don…

## How to Make $1000 with Your Telescope

**Tom Koonce** **Antelope Valley Astronomy Club, Inc.** **Lancaster, California**

So…You've observed the Moon and the planets in detail. You've awed your family with close-up views of craters, rings, and subtle hues of color. You've used your observational successes to justify "investment" in the purchase of a bigger, better telescope and sharper eyepieces with wider fields of view so that you can observe deep-sky objects like remote galaxies and faint nebulae. You know what a SCT is and know and understand cool down times, stellar magnitude, seeing, and why every serious amateur needs a Telrad. Perhaps you invested in imaging equipment and are starting to produce night sky pictures like those in the magazines. Does this fit you?

Now you're asking yourself, "How can I make some money with my telescope to recoup my investment? …*How can I make $1000 with my telescope?*"

The weather will be warming up soon, and the opportunity to feel that sense of sustained excitement you always get as you head back out under the stars. More importantly, you'll soon have opportunities to interact with others who don't have your knowledge of astronomy, and certainly don't have the kind of telescope equipment you've put together! Sharing nighttime views with others is the key to getting a big payoff from your telescope. No, not by *charging* people to view through your eyepiece, but instead by getting a charge out of someone's first spectacular view through your telescope!

How can you make $1000 from your telescope? If you want *fast* cash, I suggest that you start out with a telescope worth *$2500* and offer it for sale on AstroMart.com. But by offering views of the night sky to people who have never had the opportunity, you'll easily get $1000 of value for every adult who gasps in astonishment when seeing the Ring Nebula or a distant galaxy,

*(Continued on page 3)*

**Upcoming Events:**

| | | | |
|---|---|---|---|
| **Meeting !** | **Feb 2nd** | **7 PM** | **Mallard Lodge** |
| **Observing !** | **Feb 12th** | **Dusk** | **Equestrian Cntr** |

# Space

*Jerry Truitt*

We spend a lot of money on equipment to take pictures of the heavens. Most of us would love to be able to fly high enough to see the Earth curve and peer out at the black of space. This of course is without making a call to Richard Branson and forking over 200K for 3 or 4 minutes of weightlessness.

I get a mag on my Kindle call Technology Review from MIT. It has an article this month about Oliver Yeh and Justin Lee, both MIT students who set out to fill their dreams on a student's wages. Their goal was to fly to the upper reaches of Earth's atmosphere and take pictures showing the curvature of the Earth and the blackness of space and beyond. Oh yeah and they wanted to spend no more than $150.

First on their list of items was a weather balloon, costs $20. This vehicle is capable of reaching 93,000 feet for about 4 hours before it pops. They used a 350g Sounding Balloon from Kaymont.

The Department of Atmospheric Science at the U of Wyoming assesses wind direction and strength which helps predict where the chute might drop the equipment. This is for planning your launch, so stop picturing yourself driving madly around trying to predict the flight path.

Now to protect the equipment they went totally high tech, not! Turns out they found a Styrofoam beer cooler would work fine. They insulated the beer cooler with newspaper and fresh hand warmers next to the camera equipment.

Now to get our equipment back to Earth safely we need to fabricate a parachute, Yeh and Lee found pretty much anything will work for this, even a well rigged trash bag. Wow, a beer cooler and trash bag chute, if only NASA had known this before they tried to bring down the Genesis capsule. The chute gives another 40 minutes of shoot time. While I'm sure NASA spent millions on the development of the Genesis chute, Yeh and Lee dropped a couple of beer coolers packed with newspaper and a carton of eggs from a building to test their system.

Yeh and Lee modified an off-the-shelf 7.1 megapixel Canon A470 camera by using open source software from the internet that instructed the camera to shoot pics every 5 secs, with an 8 gig chip this was almost 5 hours of images. Cheapest I could find this camera priced was $89. A hole in the beer cooler for the lens and the camera was mounted to peer out.

Now this requires you get the camera back you're thinking. Well they used a low cost GPS tracking service with a $39.99 Motorola i290 prepaid cell phone sporting a GPS transmitter launched in the beer cooler and wrapped in hand warmers too. This allowed them to track the balloon and chute landing.

The batteries for camera and phone were Lithium designed to work down to -40 C.

I should mention that you should check with the U.S. Federal Aviation Administration and check on federal and local regulations before trying to reach the outer limits. Seems these guys have strict laws and a dim view of anyone who goes above a certain altitude on their own. Typically they are concerned with packages 4 or more pounds in weight but check first.

Yeh and Lee report the results were fantastic. They say their ultra low-budget balloon went 17.5 miles high into the uppermost parts of the stratosphere and returned 5 hours later. They tracked the device with GPS and found it some 20 miles away from the launch site.

See their results and cost tally sheet on the next page.

*(Continued on page 3)*

**How to Join the Delmarva Stargazers:** Anyone with an interest in any aspect of astronomy is welcome

NAME_____

ADDRESS_____

CITY, STATE & ZIP_____

E-MAIL ADDRESS (If any)_____

Do you need the newsletter snail mailed to you (Y/N)?_____

Please attach a check for $15 made payable to Delmarva Stargazers and mail to Kathy Sheldon, 20985 Fleatown Rd, Lincoln, DE 19960. Call club President Don Surles at 302-653-9445 for more information.

| Item | Weight | Cost |
|---|---|---|
| Sounding Balloon 350g from Kaymont | 350g | ~$20 +$20 (helium) |
| Parachute | ~10g | ~$3* |
| Motorola i290 Prepaid Cellphone | ~90g, | ~$50** |
| Styrofoam Beer Cooler | ~15g | ~$0 |
| Duct Tape | ~10g | ~$0 |
| Zip Ties | ~5g | ~$0 |
| Canon A470 with 8GB SD card | ~165g, | ~$40 |
| Insulation material- newspaper | ~5g | ~$0 |
| Duracell USB phone charger powered by AA batteries | ~20g 1oz | ~$10 |
| Instant Hand warmer | ~5g | ~$2 |
| 4 Ultimate Lithium AA batteries | ~15g * 4 = 60 g | ~$5 |
| Radar Reflector (aluminum foil) | ~0g | ~$0 |
| Total | ~800g, /w misc. | ~$150 |

Check these guys out at: http://space.1337arts.com/guide

*(Continued from page 1)*

comprehending their physical significance. You'll get a million dollars of satisfaction each child that sees the craters on the Moon and the rings of Saturn for the first time and cries out with joy.

How can you make money in amateur astronomy? The truth is, if you're involved in this hobby to make cash, you can either sell your amazing astrophotos, meteorites that you found, or maybe invent the next Telrad. But if you want the real payoff, then share your love of astronomy with others as the weather turns warmer. You will provide them inspiration and enrichment worth $1000 and more.

Outreach Resources:

For individuals:

http://www.noao.edu/education/ http://astronomywebguide.com/links_amateurastronomers.html

For Clubs: http://www.astrosociety.org/education/resources/AAISASurveyResults.pdf

http://kepler.nasa.gov/education/amateurAstronomersResourceKits/

## Meteor Sighting

*Chuck Jennings*

It was Monday evening on 1/18 and we were heading home from a nice family day at the Franklin institute. We were driving south on I-95 at what I believe was ~5PM, and having just passed Franklin field, Karen and I shared a few choice words about our beloved Philadelphia Eagles. Karen decided to change the subject, and suggested that the boys look for Jupiter. By this time we were passing the airport, when all of the sudden we saw what looked like a fire trail in the sky that seemed to be increasing in size. Having just passed the airport, our hearts sunk thinking that we had just witnessed a tragedy, however we shortly realized that it was a meteor after seeing the flames dissipate and the trail that it left in the atmosphere. In retrospect, it reminded me of the Black Brant launch that we saw at the "No Frills" only it was heading towards Earth. The trail looked iridescent and was present in the atmosphere for what seemed like 10 min. Since Karen was driving, I had my camera on looking at pictures we had just taken, but I couldn't get it switched to video fast enough to catch the event. I did attempt to get a video of the trail, but it's not visible in the video. It was a fantastic sight, and I feel lucky to have witnessed a once in a lifetime event.

### Your 2009-2010 Officers

| Office | Officer | Phone | email |
|---|---|---|---|
| President | Don Surles | 302-653-9445 | don.surles@verizon.net |
| President-elect | Jerry Truitt | 410-885-3327 | Truittjs@Atlanticbb.net |
| Secretary | Michael Lecuyer | 302-284-3734 | mjl@terpacis.org |
| Treasurer | Kathy Sheldon | 302-422-4695 | f.a.sheldon@att.net |
| Past President | Tim Milligan | 410-841-9853 | Milligan@integ.com |

# Building a Case Against Ozone

*Patrick Barry*

When it comes to notorious greenhouse gases, carbon dioxide is like Al Capone—always in the headlines. Meanwhile, ozone is more like Carlo Gambino—not as famous or as powerful, but still a big player.

After tracking this lesser-known climate culprit for years, NASA's Tropospheric Emission Spectrometer (TES) has found that ozone is indeed a shifty character. Data from TES show that the amount of ozone—and thus its contribution to the greenhouse effect—varies greatly from place to place and over time.

"Ozone tends to be localized near cities where ozone precursors, such as car exhaust and power plant exhaust, are emitted," says Kevin Bowman, a senior member of the TES technical staff at the Jet Propulsion Laboratory. But the ozone doesn't necessarily stay in one place. Winds can stretch the ozone into long plumes. "Looking out over the ocean we can see ozone being transported long distances over open water."

Unlike $CO_2$, ozone is highly reactive. It survives in the atmosphere for only a few hours or a few days before it degrades and effectively disappears. So ozone doesn't have time to spread out evenly in the atmosphere the way that $CO_2$ does. The amount of ozone in one place depends on where ozone-creating chemicals, such as the nitrogen oxides in car exhaust. are being released and which way the wind blows.

This short lifespan also means that ozone could be easier than $CO_2$ to knock off.
"If you reduce emissions of things that generate ozone, then you can have a quicker climate effect than you would with $CO_2$," Bowman says. "From a policy standpoint, there's been a lot of conversation lately about regulating short-lived species like ozone."

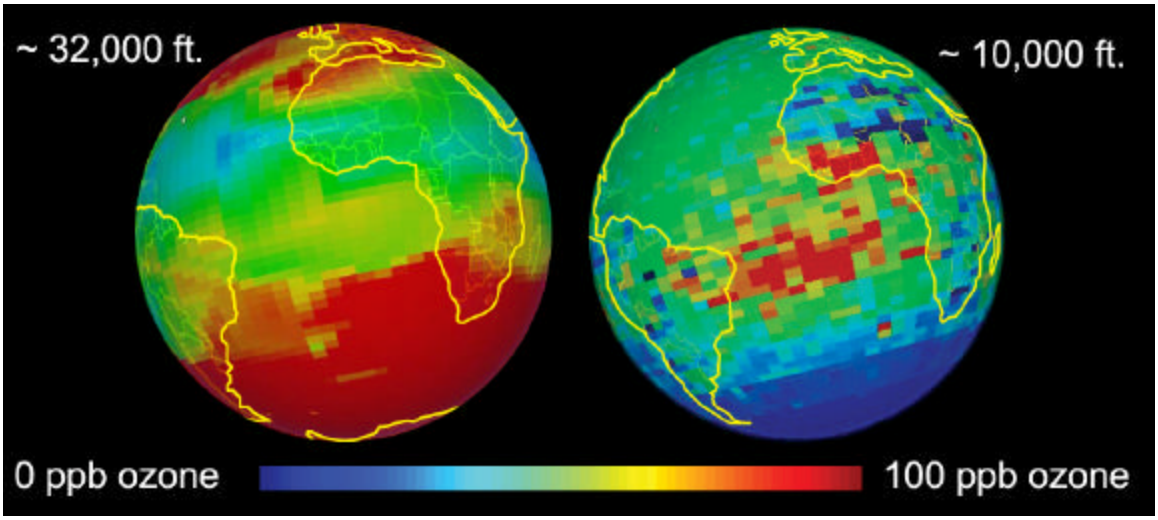
To be clear, Bowman isn't talking about the famous "ozone layer." Ozone in this high-altitude layer shields us from harmful ultraviolet light, so protecting that layer is crucial. Bowman is talking about ozone closer to the ground, so-called tropospheric ozone. This "other" ozone at lower altitudes poses health risks for people and acts as a potent greenhouse gas.

TES is helping scientists track the creation and movement of low-altitude ozone over the whole planet each day. "We can see it clearly in our data," Bowman says. Countries will need this kind of data if they decide to go after the heat-trapping gas.

Ozone has been caught red-handed, and TES is giving authorities the hard evidence they need to prosecute the case.

Learn more about TES and its atmospheric science mission at tes.jpl.nasa.gov. The Space Place has a fun "Gummy Greenhouse Gases" activity for kids that will introduce them to the idea of atoms and molecules. Check it out at spaceplace.nasa.gov/en/kids/tes/gumdrops.

*This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.*




*These images are TES ozone plots viewed with Google Earth. Colors map to tropospheric ozone concentrations. The image on the left shows ozone concentrations at an altitude of approximately 32,000 feet, while the one on the right shows ozone at approximately 10,000 feet. The measurements are monthly averages over each grid segment for December 2004.*

# The Telescope….

Don Surles

Last year, 2009, was dedicated to Galileo and the telescope because Galileo is credited with being the first person to use the telescope for astronomical purposes, 400 years ago in 1609. I found the comparisons of early telescopes to those we use today very interesting; indeed we have made significant progress in the design of the telescope and astronomical research in the last 400 years.

Unfortunately most people incorrectly believe Galileo "invented" the telescope. It is true that Galileo "improved" the existing versions of the telescope and he was the "first" to use it for scientific purposes but Galileo did not invent the telescope.

Following is some information I gathered from various sources on the Internet that credits Hans Lippershey with the first patent request for a telescope in 1608 and references to an instrument that performed like a telescope created by Leonard Digges around the 1550's.

The first patent mentioning a telescope and its design is assigned to a German-Dutch lens maker named Hans (Johann) Lippershey. Following are a few bits of surviving information surrounding Lippershey and the beginnings of the telescope.

Johann Lippershey was born in 1570 in Wesel, Germany. He settled in Middelburg in the Netherlands in 1594, married the same year, and became a citizen of the Netherlands in 1602 (German Johann became Dutch Hans). He remained in Middelburg until his death.

He is credited with creating and disseminating designs for the first practical telescope. Lippershey is believed to be the first to apply for a patent for his design (beating Jacob Metius by a few weeks), and making it available for general use in 1608. He failed to receive a patent because the States General ruled that no patent should be granted because so many people knew about it and the device was so easy to copy but he was handsomely rewarded by the Dutch government for copies of his design. The "Dutch perspective glass", the telescope that Lippershey invented, was a 3X magnifier. His telescopes were made available to Henry IV of France and others before the end of 1608. The potential importance of the instrument in astronomy was recognized by, among others, Jacques Bovedere of Paris; he reported the invention to Galileo, who promptly constructed his own telescope in 1609.

Here is another account of Lippershey's patent request:

His craft was that of spectacle-maker. Middelburg was a flourishing city, especially after the fall of Antwerp to the Spanish in 1585, which caused many of its Protestant inhabitants to flee north to the Netherlands. New glass-making techniques were introduced here by Italians in the 1590s, and perhaps some ideas about combining lenses were abroad in this glass-making community. Although others have claimed the invention of the telescope and the device was impossible to keep secret, the earliest record of the existence of such a device is a letter of the government of Zeeland to its delegation to the States General of the Netherlands, dated 25 September 1608, which instructs them to be of help to the bearer, "who claims to have a certain device by means of which all things at a very great distance can be seen as if they were nearby, by looking through glasses which he claims to be a new invention." On October 2, 1608, the States General discussed Lippershey's application for a patent on the instrument. Although the patent was eventually denied because it was felt that the device could not be kept a secret, Lippershey made several binocular telescopes for the States General and was paid handsomely for his services.

Shortly after that, the States General were also petitioned by Jacob Metius of Alkmaar, a city in the north of the Netherlands, who also claimed to be the inventor. The claim of yet a third person, Sacharias Janssen, also a spectacle-maker in Middelburg, emerged several decades later. The surviving records are not sufficient to decide who was the actual (or as it was put in the seventeenth century, the first) inventor of the telescope. All we can say is that Lippershey's patent application is the earliest record of an actually existing telescope.

In 1608, Lippershey submitted for sale to the government of The Netherlands an invention which consisted of a tube with one fixed lens and an eye lens that could be adjusted for focus. The potential military applications for this device were obvious and, after he had made a few modifications and produced a binocular version, the government paid him 900 florins for the device.

The truth is that the telescope had been evolving in fact and theory for the better part of 300 years, awaiting improvements in the manufacture of lenses for final perfection.

The significance of Lippershey's device is that it made practical use of an effect that had previously been regarded as little more than a lens grinder's parlor trick.

One story relating to the development of the telescope involves Lippershey noticing two children playing with lenses in his shop. The children observed that when they looked through two lenses, a weather vane on a nearby church appeared to be larger and clearer. According to the story, Lippershey tried it himself and realized the amazing possibili-

## Magazine Subscriptions

As a paid member of DMSG, you can sign up/renew your S&T or Astronomy mags through the club for a discount over private rate. S&T, reg. $42.95, is $32.95 thru DMSG, Astronomy, reg. $44, is $34. See Michael Lecuyer for details.

ties. He then placed a tube between the lenses to make a telescope. Lippershey called his invention a "kijker", meaning "looker" in Dutch and in 1608, applied for a patent with the Belgian government. Even though he was paid very well for his invention, a patent was not granted because it was felt that the simple device could not be kept a secret.

Furthermore, Lippershey is, at least, generally considered the first person to describe a telescope in writing. Leonard Digges was born in 1520 at Digges Court, in the parish of Barham, in Kent, UK. Very little is known about his early life, but he was educated at the University of Oxford. He became well known as a mathematician and surveyor as well as a great populariser of science.

Around 1551, he invented the theodolite as well as inventing and improving a number of other items for use by surveyors, carpenters and masons. More importantly, around the same time, he apparently invented the telescope, both refracting and reflecting. Here's what his son, the famous English astronomer, Thomas Digges, wrote in the preface of one of Leonard's books:

"He may wonderfully helpe him selfe, by Perspective glasses. In which (I trust) our posterity will prove more skillfull and expert, and to greater purposes, than in these days, can (almost) be credited to be possible."

and about the reflecting telescope:

"..... my father by his continual pain-full practices [practical experiments], assisted with Demonstrations Mathematicall, was able and sundrie Times hath by proportionall Glasses duly situate in convenient angles, not onely discovered things farre off, read letters, numbered peeces of money with the very coyne and superscription thereof, cast by some of his freends of purpose uppon Downes in open fields, but also at seven miles declared what had been doon at that instant in private places....."

The first of his Leonard Digges's books, "The General Prognostication," was published in 1553. It was expanded and republished in 1555 as "A Prognostication of Right Good Effect" then revised again the following year with the title "Prognostication Everlasting." These books became best sellers and enhanced Digges's reputation partly because they were written in English when standard scientific publications were normally in Latin. The Prognostication books were actually early almanacs with data for astronomy and astrology, calendars of church events and moon motions for several years, information on timekeeping and weather phenomena and even instructions for bloodletting.

Perhaps one reason nothing ever came from his telescope inventions was that Leonard's career hit a brick wall when he took part in an unsuccessful rebellion in 1554 led by the Protestant Sir Thomas Wyatt against England's new Catholic Queen Mary who took over the throne in 1553 from her father Henry VIII. Originally Digges was condemned to death, but had his sentence commuted, instead forfeiting all his estates. He spent the rest of his life trying to regain his properties and reputation. Leonard Digges died in 1559.

So, we may never know exactly when or exactly who invented the telescope but we have continued to improve the critter for the last 400-700 years. And who knows what the future scopes will be…will they make our current scopes as “antique” as Galileo’s scopes are today?

## *Tenth Annual Mid-Atlantic Mirror Making Seminar*

Delmarva Star Gazers will host the 10th Mid-Atlantic Mirror Making Seminar Friday March 12 through Sunday March 14, 2010, at Mallard Lodge, Smyrna, DE. Mirror makers and other attendees should check into the Lodge before 11:00 AM Friday. Activities begin at Noon, March 12, 2010.

Mirror making stations are on a first come, first served basis. Non-mirror makers are encouraged to attend; to watch the process, to learn, to "get glasspushin' fever", and to participate in other planned activities

Mallard Lodge can comfortably accommodate 25-30 people overnight; sleeping rooms and bunks are dormitory style with common bathroom facilities. We can accommodate ladies and gentlemen due to the multi-room layout. Please be aware this is a NATURE FACILITY, not the Hilton. You will need to bring your own towels, blankets/sleeping bags, pillows, and toiletries. If attendees exceed the bunk capacity there is ample room for air mattresses (we will have a few to lend if necessary). Accommodations are available on a first come, first served basis. All meals will be provided by the Star Gazers. Fact: Delmarva Star Gazers like to eat, so bring your appetite.

We are on our tenth Seminar, all have been very successful. Every participant and every person involved as a host has commented favorably on the experience. We have had many "repeaters" who come back to make another mirror or type of telescope; let's assume they have caught glasspushin fever. This tenth Seminar should be a wonderful late Winter-time weekend in a very interesting environment and in the company of amateur astronomers learning how to "push glass".

Come and join us - we look forward to your company.

see www.delmarvastargazers.org/archive/mw10/index.html for details

# Observing

Pj Riley

The picture below was recently sent around the internet, again. It is a nice 'photo'. I bring it to your attention here for one reason: you need to comprehend what you are observing, whether it's in the sky, or on the web. This picture looks like the moon is so low that it would almost tough the ground. Do you remember seeing solar eclipses? During a solar eclipse, the moon is just big enough to block the sun, but sometimes (at apogee) it doesn't, leavin' a slight ring. To us on earth, the moon and the sun appear to have the same 'apparent' diameter. This holds true if the observer is at the equator or the poles. So the moon would not appear that much bigger than the sun.

So when, and where, would you see the moon appear so much bigger than the sun ? Probably only when you're on approach for a lunar landing.

Also, to appear as it does in the photo, the moon would need to leave it basic equatorial orbit and head north, way north.

This image, called "Hideaway", is in fact a work of art by artist Inga Nielsen.

"Hideaway" was featured on NASA'S Astronomy Picture of the Day (APOD) website 20-June-2006.

So keep this in mind when you're looking a picture someone sent you in an email. The photo may be real, or it may be a work of art. You'll only knowing by 'observing'.

**The February Sky—From Half-Hours with the Stars (1911)**
**RICHARD A. PROCTOR, F.R.A.S.**

The Great Bear (*Ursa Major*), with its Dipper and Pointers, is now high up in the northeastern sky. The Pointers direct us to the Pole Star, (a of the Little Bear *Ursa Minor*). A line from the Pole Star to the Guardians of the Pole (ß and ?) lies in the position of the minute hand of a clock 18 minutes after an hour. The Dragon (*Draco*) extends from between the Bears to the horizon—east of north—where its head with its two bright eyes can be seen.

*Cepheus* is low down, somewhat to the west of north; his Queen (*Cassiopeia*) the Seated Lady, beside him (a and ß mark the top rail of her chair's back); while above her lies the poor constellation *Camelopardus*, the Giraffe.

*Andromeda*, the Chained Lady, is in the northwest, low down—in fact, partly set; the Triangles and the Ram (*Aries*) beside her, toward the west. Above them is *Perseus*, the Rescuing Knight; and above him, somewhat to the west, the Charioteer (*Auriga*). The Bull (*Taurus*), with the *Pleiades* and the bright *Aldebaran*, is in the mid-heaven, due west; *Gemini*, the Twins, higher, and toward the southwest. *Orion*, below them, is already slanting toward "his grave, low down in the west"; beneath him the Hare, and in the southwest a part of the River (*Eridanus*).

Due south is a part of the Star Ship (*Argo*), beside which, low down, is the foolish Dove (*Columba*), while above leaps the Great Dog (*Canis Major*), with the splendid *Sirius*, chief of all the stars in the sky, marking his mouth.
High up, a little west of north, is the Little Dog (*Canis Minor*); and higher, a little east of north, the Crab (*Cancer*), the "dark constellation," as it was called of old, with the pretty cluster *Præsepe*, or the Beehive.

The Sea Serpent (*Hydra*) is rearing his long neck high above the horizon, bearing on his back, absurdly enough, Noah's Cup (*Crater*) and Noah's Raven or Crow (*Corvus*).

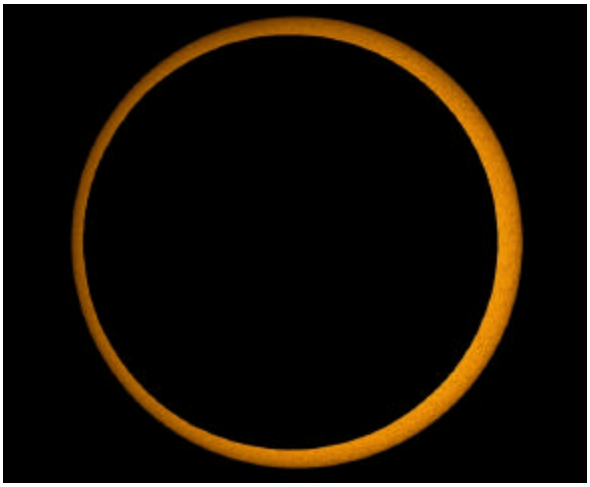
Nearly due east, the Virgin (*Virgo*) has risen, Spica shining brightly just above the horizon. The Lion (*Leo*) occupies the mid-space above; the "Sickle in the Lion"—its handle marked by ? and a, its curved blade by ?, µ, and e—will at once be recognized. The Hair of Queen Berenice (*Coma Berenices*) is nearly due east, and fairly high. Between this small but remarkable group and the Great Bear, lies Hevelius's foolish constellation, the Hunting Dogs (*Canes Venatici*). Lastly, in the northeast, the Herdsman (*Boötes*), with the orange-yellow brilliant, Arcturus, is rising, though at present, paradoxical as it may seem, he lies on his back.

Looking for a skymap ? Goto: www.skymaps.com

# Astrophotos

by Members and Friends

This is a picture of the Cone Nebula/Christmas Tree Cluster region that I just finished up. It was taken with my AP 130mm EDF telescope using a ST-10 XME camera - Joe Morris



**Millennium Annular Solar Eclipse**

Credit & Copyright: Mikael Svalgaard

The Moon's shadow raced across planet Earth on January 15. Observers within the central shadow track were able to witness an annular solar eclipse as the Moon's apparent size was too small to completely cover the Sun. A visually dramatic ring of fire, the annular phase lasted up to 11 minutes and 8 seconds depending on location, the longest annular solar eclipse for the next 1,000 years. This picture of the Moon's silhouette just before mid-eclipse was taken within the eclipse path from the city of Kanyakumari at the southern tip of India. The telescopic image was made through a filter that blocks most visible light, but still transmits light from hydrogen atoms. As a result, detailed mottling, or granulation, caused by heat convection in the Sun's atmosphere can be seen around the dark lunar disk.

Moondark is on hiatus this month. The column should return soon. Look here or keep an eye out on the *Moondark web site* ).