On July 12, Neptune completes its first trip around the Sun since it was found by German astronomer Johann Gottfried Galle in 1846.
Two New Moons in One Month

The chances of two New Moons falling within one calendar month are just the same as two Full Moons, but because New Moons are generally invisible (except during an eclipse), most people tend not to notice the occasions when a month has two of them.

Not-so-Dark Skies

The Crab Nebula was produced by a supernova explosion that was observed in 1054 A.D. The Chinese and Arab astronomers at the time noted that the explosion was so bright, that it was visible during the day, and lit up the night sky for months.
July Night Sky

July 15, 2011 @ 9:00pm CDT

Not Dark Outside Yet? Go Shopping!

If it's not quite time to look at the stars, head on over to the new FWAS virtual store at Cafepress.com and get geared up with t-shirts, caps, mugs, tote bags, bumper stickers, and more cool stuff that feature the FWAS initials and logo for members to order. Visit http://www.cafepress.com/fortworthastro and show your FWAS pride.
Observation & Outreach Opportunities

**FWAS & Noble Planetarium Star Party**

Star Parties are the public outreach events of the society. Club members volunteer their time and telescopes to educate the public about the night sky. Star parties are also excellent opportunities for those new to astronomy, as they give the beginner a chance to use different kinds of equipment or ask experienced club members for assistance with their own equipment.

We set up in the front of the Museum at 1600 Gendy where you can back your vehicles up to the curb around the circle the front of the Museum of Science and History and the Cowgirl Museum. From there you can unload and set up on the sidewalk area. You may leave your cars and trucks at the curb, that way you will not have to pay the parking fee.

This change is due to the fact that the Parking Lots are now fee based. (Be sure to check the e-group in the days leading up to the star party). Brownie Bribes are often provided! (Linda Krouse and Michele Martinez)

**OUR NEXT STAR PARTY:** July 9 (weather permitting)

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**Three Rivers Foundation (3RF) Star Party**

3RF invites you out to Comanche Springs near Crowell, Texas for a night under the stars. The dark skies of Big Ranch Country provide a spectacular view of the universe. The party starts with solar observing two hours before sunset. Evening activities begin with a short educational introduction to astronomy. The observatories and Star Field are then opened to the public to enjoy the use of many different kinds of astronomy instruments.

If you would like additional information about programs at Comanche Springs Astronomy Campus, contact: Three Rivers Foundation or call 940-684-1670. Other information on the Comanche Springs, Driving Directions and Observing Conditions pages.

Lunar Observation: July 9, about 6:00 to 11:00 PM

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**Estero Llano Grande State Park - Full Moon Party**

Come celebrate the full moon and see all that the park has to offer after hours. We will take a night hike, learn about the stars and constellations, search for scorpions, tarantulas, common pauraqueas, frogs and owls and much more! Accessible for the mobility, visually and hearing impaired. Contact Phone (956) 565-3919.

July 15, 8:00 PM to 10:00 PM, Estero Llano Grande State Park - World Birding Center

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**Purtis Creek State Park - Stargazing**

Make a star wheel and learn how to use it, learn about the solar system and view the night sky through a telescope. Weather permitting, meet at the over flow camping parking lot. Contact Phone (956) 565-3919.

July 23, 9:00 PM to 10:00 PM, Purtis Creek State Park

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**Copper Breaks State Park - Sun Fun and Starwalk**

Begin your celestial journey in the afternoon with Sun Fun, which features solar viewing of our closest star, the sun. In the evening take a Star Walk for a naked eye tour of the night sky over the park followed by a closer look through telescopes and binoculars. Accessible for the mobility impaired. Call for specific times; fees free for Texas State Parks Pass members, $2 non-members, $1 senior citizens, free for children 12 and under. Contact Phone (940) 839-4331.

July 30, 5:00 PM to 05:00 PM, Copper Breaks State Park
Neptune: The Planet, Rings and Satellites

by Ellis D. Miner and Randii R. Wessen
Published in 2002 by Springer-Praxis Books
322 pages
ISBN 978-1852332167

Book review by Matt J. McCullar, FWAS

When I was a boy one of my very first astronomy books was The Golden Book of Astronomy, a rather large hardback full of colorful illustrations. It was published in the 1950s, so there were very few photographs of astronomical objects within it. One page was dedicated to the planets Uranus and Neptune, and the last sentence of that page fascinated me as a child: “Not until the year 2011 will Neptune be back at the position on its orbit where it was first seen.” That occasion takes place on July 12, though we won’t see it in precisely the same place in the sky because the Earth will be in a different position of its own orbit. Neptune was discovered on September 23, 1846, and moves so slowly that it takes 164.79 Earth years to complete an orbit. Neptune is much larger than the Earth, but is made up mostly of gas. It cannot be seen without optical help.

The discovery of Neptune was either a stunning triumph or a mind-blowing coincidence. Its existence was mathematically predicted by two people independently before it was actually discovered. Both mathematicians (Adams of Great Britain and Le Verrier of France) worked long hours on the problem of why the planet Uranus wasn’t moving through the sky exactly the way astronomers said it should. The gravity of another, more distant planet could possibly explain it. Neptune was found within one degree of the location predicted. (Recent research indicates, however, that Adams may not deserve as much credit for Neptune’s discovery as originally thought.)

Since Pluto’s demotion, Neptune is now officially our solar system’s most distant planet. For many years we knew very little about Neptune. Two satellites were found early on, but even the planet’s exact size was unknown until the Voyager 2 space probe flew only a few thousand miles over its cloudtops in 1989, sending back hundreds of pictures and other data.

The book Neptune explains in a clear, entertaining manner how the many discoveries of the planet and its satellites have come about over the years. The overwhelming majority of them came only recently. The authors explain why it was necessary for a space probe to ascertain the true structure of Neptune’s ring system. The planet Uranus’s rings were found by measuring the light output of a known star before and after Uranus passed in front of it and occulted it. Could the same technique be used for Neptune? “Occultation observations were much more difficult with Neptune than they were for Uranus. One reason is that, although Uranus and Neptune are both about the same size, Neptune is one 1.5 times more distant. The greater distance implies that Neptune has a smaller apparent disk, and a smaller disk blocks fewer stars, and, because of this, Neptune stellar occultations occur only a few times each year. Another reason why these observations are less likely to discover rings around Neptune concerns the axial tilt of Uranus compared to Neptune. If we assume that rings are equatorial, Uranus’s axial tilt of 98° increases the chance that its rings will appear opened, as viewed from Earth. An open ring system subtends a larger amount of sky, thus increasing the chances that the rings will occult a star. Uranus’s rings are fully open to Earth observers for approximately half a Uranian year (42 Earth years) while Neptune’s rings (if they existed and were in its equatorial region) would almost always be edge-on to Earth-based astronomers.”

Neptune describes many of the obstacles that Voyager 2 and the ground-based astronomers had to overcome to obtain the stunning visuals and important data during the probe’s too-brief flyby. It takes light and radio signals over four hours to make a one-way trip, and there was no chance for a do-over. The discovery of powerful windstorms on Neptune came as a surprise, as did the strange geography of its largest satellite, Triton.

The existence of Neptune was predicted in the 1840s by mathematicians who had to make some scientific assumptions, some of which turned out to be very wrong. Yet Neptune was found. Triumph or coincidence? Neptune may be a world full of coincidences; an occultation of what was thought to be a ring or ring arc of Neptune turned out, years later, to have been caused by a satellite that wasn’t discovered until after the Voyager 2 encounter. What are the odds of a tiny moon just happening to be in line between Earth and a star at that precise moment?

The book spends a great many pages discussing other planets in the solar system, but in a way that helps the reader understand the big picture much better. There is a great deal to absorb in Neptune but it is presented in a very interesting way and you may find yourself reading several chapters at a time before taking a break. The authors were part of the Voyager team at Jet Propulsion Laboratory and they really know their stuff.

Recommended for readers age 16 and up.
Draco, or the Dragon, is a constellation in the northern hemisphere. It was first charted by the Greek astronomer Ptolemy in the 2nd century. In ancient Egypt, the constellation was called Tawaret, after the vigilant, protective goddess of the northern sky, whose body was depicted as part-human, part-lioness, part-crocodile and part-hippopotamus.

In Greek mythology, the constellation Draco was identified with the dragon Ladon, which had a hundred heads and was in charge of guarding the Garden of the Hesperides, the orchard of the goddess Hera where golden apples that gave immortality grew. When Hercules was given the task to steal the apples, he enchanted Ladon with music and put him to sleep before stealing the apples. Hera later placed the dragon among the stars.

Draco is also associated with the dragon that guarded the Golden Fleece and was killed by Jason, as well as with the dragon killed by the Phoenician prince Cadmus before he founded the city of Thebes in Boeotia in Greece. In early Christian mythology, Draco was identified with the serpent that tempted Eve in the Garden of Eden.

The constellation Draco occupies an area of 1083 square degrees and contains five stars with known planets. It can be seen at latitudes between +90° and -15° and is best visible at 9 p.m. during the month of July. For many observers in the northern hemisphere, Draco never sets below the horizon.

The brightest star in the constellation is gamma Draconis or Eltanin (“the serpent”), an orange giant 148 light-years distant. It lies close to the point directly over London and is sometimes called the “zenith star.”

Draco also contains several notable deep sky objects. The Cat’s Eye Nebula, NGC 6543, is a planetary nebula shaped like a blue disc, formed by a bright, hot central star that lost its outer envelope about a millennium ago.

The Spindle Galaxy, NGC 5866, is a lenticular galaxy with a notable dust disk, seen edge-on. It is considered by some to be a candidate for Messier 102, a galaxy it closely resembles.

The Draco Dwarf Galaxy is a spheroidal galaxy and a satellite galaxy to the Milky Way. It has very little interstellar dust and contains mostly old stars; a significant number of red giants, five carbon stars and more than 260 variables, most of them RR Lyrae-type.
SLONG and SLAT are the theoretical position on the moon's surface of the most librated point that's illuminated and visible from the Earth. SLAT values with a “T” indicate the point is at the terminator and the actual point of maximum libration is in darkness.

TLIB is the amount of angular visibility over the face defined by 90E to 90W longitude.

ILL%: 0.00 = New moon, 1.00 = Full moon, 0.50 is first or last quarter and you have to see if the moon is waxing (ILL% increasing) or waning (ILL% decreasing) to determine.

### Night Sky in July

**Challenge binary star:**
24 Ophiuchi

**Challenge deep-sky object:**
NGC 6380 (Scorpius)

**Top ten binocular deep-sky objects:**
IC 4665, LDN 1773, M4, M6, M7, M10, M12, M13, M92, NGC 6231

**Top ten telescope deep-sky objects:**
M4, M6, M7, M10, M12, M13, M92, NGC 6210, NGC 6231, NGC 6543
For best meteor shower viewing, look for Aquarius on the eastern horizon starting at midnight and into the early hours on July 29.

The Southern Delta Aquariids are a meteor shower visible from mid July to mid August each year with peak activity on July 28 or 29 July. The shower originated from the breakup of what are now the Marsden and Kracht Sungrazing comets.

The Delta Aquariids get their name because their radiant appears to lie in the constellation Aquarius, near one of the constellation’s brightest stars, Delta Aquarii. The name derives from the Latin possessive form “Aquarii”, whereby the declension “-i” is replaced by “-ids” (hence Aquariids with two i’s). There are two branches of the Delta Aquariid meteor shower, Southern and Northern. The Southern Delta Aquariids are considered a strong shower, with an average meteor observation rate of 15–20 per hour, and a peak zenith hourly rate of 18. The average radiant is at RA=339°, DEC=−17°. The Northern Delta Aquariids are a weaker shower, peaking later in mid August, with an average peak rate of 10 meteors per hour and an average radiant of RA=340°, DEC=−2°.

### History

Observations of the (then unidentified) Delta Aquariids (δ Aquariids) were recorded by G.L. Tupman in 1870, who plotted 65 meteors observed between July 27 and August 6. He plotted the radiant’s apparent beginning and ending points (RA=340°, DEC=−14°; RA=333°, DEC=−16°). This was corrected later. Ronald A. McIntosh re-plotted the path, based on a greater number of observations made from 1926 to 1933. He determined it to begin at RA=334.9°, DEC=−19.2° and end RA=352.4°, DEC=−11.8°. Cuno Hoffmeister and a team of German observers were the first to record the characteristics of a Northern Aquariid radiant within the stream around 1938. And Canadian D. W. R. McKinley observed both branches in 1949, but did not associate the two radiants. That was accomplished by astronomer Mary Almond, in 1952, who determined both accurate velocity and orbit of the δ Aquariids. She used a “more selective beamed aerial” (echo radio) to identify probable member meteors and plotted an accurate orbital plane. Her paper reported it as a broad “system of orbits” that are probably “connected and produced by one extended stream.” This was confirmed in the 1952–1954 Harvard Meteor Project, via photographic observation of orbits. The Project also produced the first evidence that the stream’s evolution was influence by Jupiter.

### Viewing

The Delta Aquariids are best viewed in the pre-dawn hours, away from the glow of city lights. Southern Hemisphere viewers usually get a better show because the radiant is higher in the sky during the peak season. Since the radiant is above the southern horizon for Northern Hemisphere viewers, meteors will primarily fan out in all compass points, east, north and west. Few meteors will be seen heading southward, unless they are fairly short and near the radiant.
The summer evenings are finally here and the best time of year to observe the sky has arrived. I have written at length in the past about how to get started in amateur astronomy, but this month we'll step it up a few notches with a discussion of what I think a beginner needs to take observing to the next level. I have no business association with any of the companies mentioned in this article, but have extensive experience to back up each of my recommendations below. I’m calling it as I see it. Your actual mileage may vary.

First, get a Telrad for your telescope. This “1X spotting scope” is the most useful accessory you’ll get and many star guides, maps and books are written that use it’s illuminated 0.5, 1.0 and 2.0 degree centering circles. I also recommend installing a “blink” kit on the Telrad to cycle the red illumination on and off to help your night vision when locating very dim deep-sky objects. There are other 1 X finders on the market that you can use, but I think the Telrad holds up the best over time.

Next, you’re going to be considering getting eyepiece filters and maybe even a new eyepiece. Here’s what I think are the essentials and I list them in priority order.

Get a Thousand Oaks Solar Filter for your telescope. By doing so, you will have instantly doubled the utility of your scope because you’ll also be able to observe during the day with your telescope. The Sun is our nearest star and a high quality glass solar filter will last you many years.

Get a high quality O-III (pronounced “Oh-three”) narrow band-pass filter that screws into the base of your eyepieces. This is the most useful deep sky filter. If you enjoy observing deep-sky objects like the Ring Nebula, Swan Nebula, or would like to observe the Veil Nebula, then get the O-III before you buy a light pollution filter, a set of color filters, or a moon filter.

If you have a Schmidt-Cassegrain telescope, get a “Skylight” filter to seal the back of the telescope tube. Then get a high quality, 2” diagonal with a 1 ¼” adapter. I like the 2” TeleVue diagonal.

If you have a Newtonian telescope, get a quality barlowed laser collimation tool. 90% of all of the newtonians/dobsonians people have me look through at star parties are incorrectly collimated and are thus performing at far less than their optical potential. The collimation tool will help you attain new levels of focus with your Newtonian. I use the Howie Glatter barlowed laser collimator and am extremely pleased with it.

Get an adjustable red light flashlight. Make sure that the brightness can be dialed down very close to the off position so that minimum light is illuminated. Now that you’re taking the next step in amateur astronomy, you’re going to have to pay more attention to your night vision. After your eyes become dark adapted, most of the single switch red flashlights are too bright and are useful only to upset them. Don’t buy any eyepiece that you haven’t had a chance to use. On the question of whether or not to buy 1 ¼” or 2” eyepieces, I’ll say that if you really enjoy amateur astronomy, you will eventually be buying 2” eyepieces, but they are expensive and you need to have a good idea of the kind of observing you will be doing most of the time. Eyepieces hold their value very well, so hold off on buying the 2” eyepieces for now and get the best 1 ¼” eyepiece that you can afford. If you’ve been reading my articles over the years, you’ll know that I recommend that buying eyepieces that are in excellent shape from amateur astronomy-based web sites like Astromart.com and build up your collection, but you should also consider companies which offer great prices for brand new eyepieces such as Woodland Hills Telescope and Oceanside Pacific Telescope.

If you want to take the next step in amateur astronomy, you’ll need to start paying more attention to your night vision. After your eyes become dark adapted, most of the single switch red flashlights are too bright and are useful only to upset them. Don’t buy any eyepiece that you haven’t had a chance to use. On the question of whether or not to buy 1 ¼” or 2” eyepieces, I’ll say that if you really enjoy amateur astronomy, you will eventually be buying 2” eyepieces, but they are expensive and you need to have a good idea of the kind of observing you will be doing most of the time. Eyepieces hold their value very well, so hold off on buying the 2” eyepieces for now and get the best 1 ¼” eyepiece that you can afford. If you’ve been reading my articles over the years, you’ll know that I recommend that buying eyepieces that are in excellent shape from amateur astronomy-based web sites like Astromart.com and build up your collection, but you should also consider companies which offer great prices for brand new eyepieces such as Woodland Hills Telescope and Oceanside Pacific Telescope.
other observers around you. Begin to pay more attention to observing etiquette. You shouldn't walk up to other observers with your red flashlight on its cord around your neck, turned up to high, thus affecting other's night vision. It is encouraged for you to park with your car headlights pointed away from the general observing area and to turn your car's interior dome lights off at the beginning of the evening.

Get a polarizing moon filter. This is made up of two polarizing filters that can rotate about each other so that you can “dial” the brightness of the moon up or down to counter the brightness when directly observing the moon. You'll find this much handier than a single neutral density filter for changing brightness of the phases.

Get a good night sky atlas. If you have an eight inch or larger telescope, I prefer the large “Sky Atlas 2000.0 Deluxe Laminated” atlas, with black stars on a white background. For smaller scopes, you can take a look at Sky & Telescope's “Pocket Sky Atlas”. This is the right time to re-read the great book “Night Watch – A Practical Guide to Viewing the Universe”.

Get a portable table to take with you observing. A sturdy folding card table works well. You'll need a place to put your maps and eyepieces.

Begin working on your Messier Pin. This is an observing challenge sponsored by the Astronomical League. By completing the observation of all of the Messier objects, you will truly know the night sky.

Dedicate an old blanket, carpet, or artificial turf to put beneath your telescope when observing. It will keep dirt and dust off of your scope, and when you drop that new eyepiece or little retaining screw out of your diagonal at 2:00 am, it will help spare those around you from hearing a staccato of four letter words punctuating the night. Not that *I've* ever done such a thing myself…

This will get you started. I didn’t mention other items such as an observing stool to sit on, color filters, a warm jumpsuit, or large camp chair for taking a break. You can add these as you go forward. Advancing in amateur astronomy is not about the equipment, but about honing your observing skills. Each item I've mentioned will either enable or simplify the technical portion of observing so that you can concentrate more on the sky and less on whether or not you have the necessary resources at hand.

Clear Skies, Tom

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Observing Club Awards

Congratulations to Fort Worth Astronomical Society members **Shawn Kirchdorfer** and **Lowell Martin**! Both were mentioned in the June 2011 edition of Reflector. Shawn is the recipient of the Outreach Club Award at the Outreach and Stellar levels. Lowell is the recipient of the Sunspotter Club Award.

The Astronomical League provides many different observing programs (clubs). These programs are designed to provide a direction for your observations and to provide a goal. The programs have certificates and pins to recognize the observers’ accomplishments and for demonstrating their observing skills with a variety of instruments and objects.

For more information about the different observing clubs and award requirements visit the Astronomical League web site at:

[http://www.astroleague.org/observing](http://www.astroleague.org/observing)
FWAS Contact information:  
fwasinfo@yahoo.com
Fort Worth Astronomical Society  
3812 Fenton Avenue  
Fort Worth, TX 76133
Club Officers:  
Steve Tuttle – President  
Shawn Kirchdorfer – Vice President  
John Dowell – Treasurer  
Dean Crabtree – Secretary
Monthly Meetings:  
FWAS meets at 7:00 PM on the third Tuesday of the month at the UNT Health Science Center – Research & Education Building, Room 100; 3500 Camp Bowie Blvd; Fort Worth. Guests and visitors are always welcome.
Web Site:  
http://www.fortworthastro.com
E-Group (members only):  
You may post messages to the group by sending e-mail to fwas@yahoogroups.com. Any message sent to fwas@yahoogroups.com will be automatically sent to all members on the list. To subscribe, send a blank e-mail to fwas-subscribe@yahoogroups.com. Include your real name.

Outreach:  
Items concerning FWAS Outreach activities should be addressed to fwasoutreach@yahoo.com.

Prime Focus:  
The FWAS newsletter is published monthly. Letters to the editor, articles for publication, photos, or just about anything you would like to have included in the newsletter should be sent to: editor@fortworthastro.com.

FWAS Annual Dues:  
$40 for adults / families, $20.00 for students (half-price Jan 1 thru May 31); checks payable to the Fort Worth Astronomical Society; payments can be mailed to 3812 Fenton Avenue, Fort Worth, TX 76133, or in-person at the next indoor meeting. Membership runs June 1 through May 31.
Discount Subscriptions Available:  
Sky & Telescope ($32.95), and Astronomy (1 year for $34.00; 2 years for $60.00). A Sky & Telescope subscription through FWAS entitles you to 10% off purchases at Sky and Telescope’s on-line store.

Astronomical League Membership:  
Your FWAS membership also enrolls you in the Astronomical League. This makes you eligible for various observing certificates and you get their quarterly magazine, Reflector.

Astronomical League Observing Clubs:  
http://tinyurl.com/3vjh4fl
Fort Worth Museum of Science & History:  
http://tinyurl.com/3jkn5j for location and schedules

If you are visiting the Club Dark-Sky Site:  
Email John Dowell that you are going.  
Sign the logbook in the camo-painted club storage unit  
Put equipment back neatly when finished  
Leave a log note if there is a club equipment problem; also, please contact a FWAS Trustee to let them know  
Maintain Dark-Sky etiquette  
Turn out your headlights at the gate!

Last person out, please…  
Make sure nothing is left out.  
Lock the gate!