Temecula Valley Astronmer

The monthly newsletter of the Temecula Valley Astronomers **September 2014**

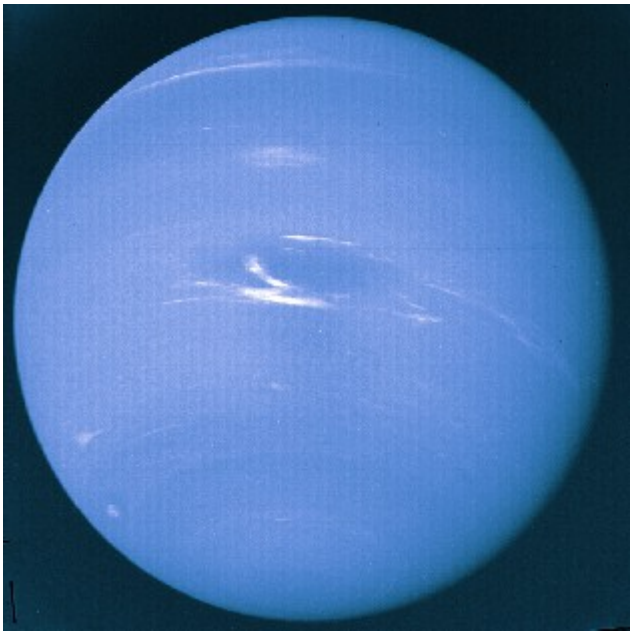
Events:

General Meeting : No meeting in September. Next meeting October 6th.

Star Party at Rancho Baker, Aug 29th. See article.

Star party at Casa Croulet has been postponed to October. Watch your email for details.

For the latest on school Star Parties, check the web page.



1989 APOD Neptune: Big Blue Giant

Credit: Voyager 2, NASA

WHAT'S INSIDE THIS MONTH:

Send newsletter submissions to Mark DiVecchio (markd@silogic.com) by the 20th of the month for the next month's issue.

Like us on Facebook

General information:
Subscription to the TVA is included in the annual $25 membership (regular members) donation ($9 student; $35 family).

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Cosmic Comments – September/2014
by President Mark Baker

Many moons ago, I thought it would be neat to be part of the organization called MENSA. I took their test and was soon invited to attend the upcoming meeting. I couldn't wait to be involved in discourses of intelligence, and be edified by deep and provocative discussions…

I didn't make it through the entire meeting, however, and never went back, letting my membership lapse. I only remember how stodgy they all seemed to be, regardless of age, and they had no clue as to how to have fun within the scope of the group.

Astronomy is a serious pursuit but WE, the TVA, do know how to enjoy the chase, as exemplified by a recent email session on Ray Stann's origins. Every response brought a smile to me and I could cite numerous other such instances… I so appreciate you all for taking the science seriously BUT not ourselves so much. I just enjoy being around you all… loads of fun, I say!!!

So here's to us keeping our "Lanterns" lifted high and giggling a little in the process…

Clear and Dark Skies, my friends…

Star Party at Rancho Baker

Mark Baker, president of the TVA, has announced the first Star Party at his Ranch in Temecula. Mark wrote:

"Please mark your calendars for Friday, 8/29/14 as we will be holding an open Star Party that night at the planned site of the future regional observatory...this will provide a great dry run and beta test for the site. Note it is primitive in every sense of the word... no electricity, water, facilities, nada!! At least yet...!!! Plan on setting up around 7pm for a 7:23pm sunset... refreshments will be provided. And if you wanna set up a tent, go for it!!! Invite your family, friends, co-workers, etc. Plenty of level ground...

Address is: 38550 Crossover Road, Temecula 92592... 2nd lot on left. Entrance, at corner at E Benton, will be marked...FYI - Do not take DePortola to East Benton!!! "

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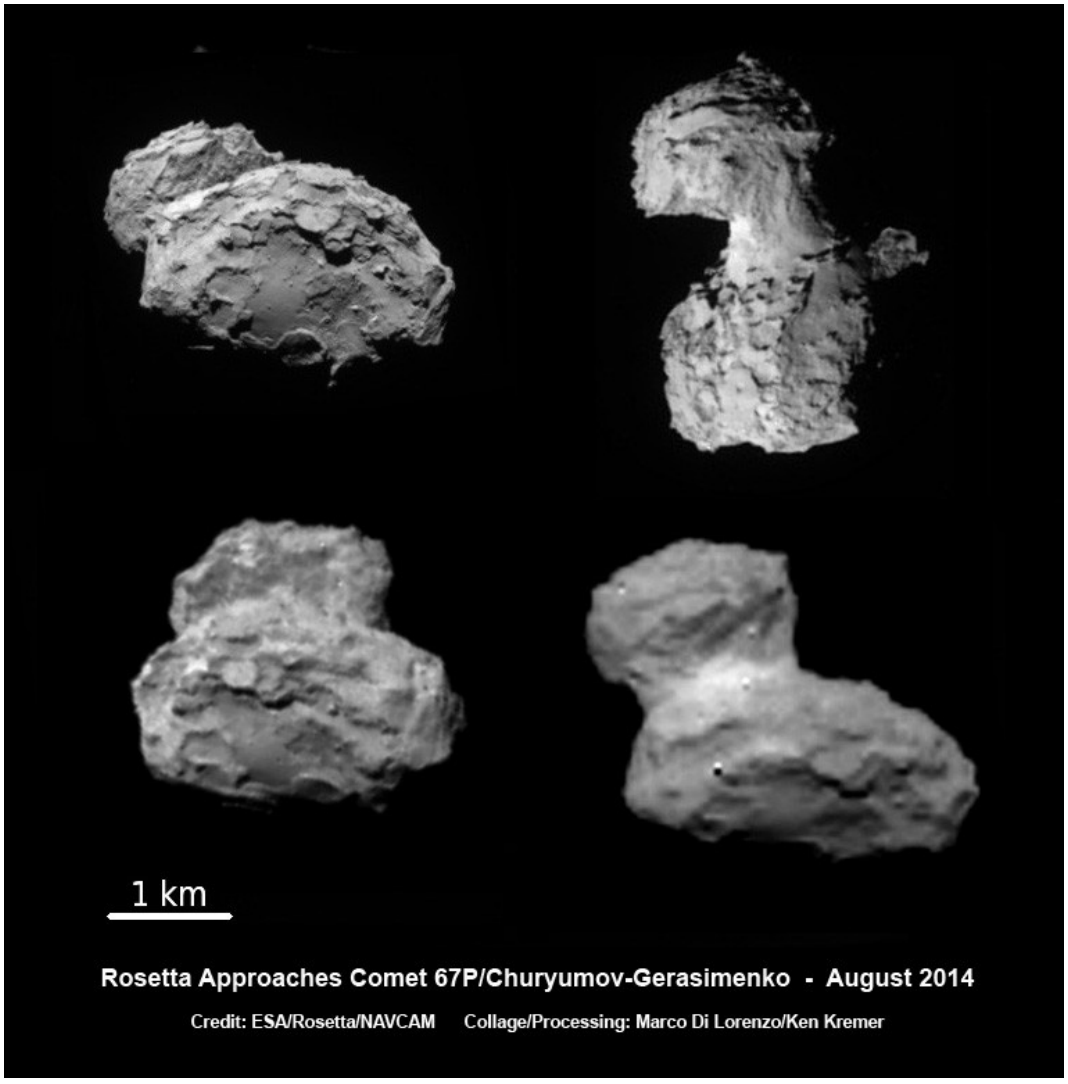
Chasing a Comet: The Rosetta Mission
By Paul Kreitz

Given my interest in “Comets and other erratic night sky phenomena”, I have been closely following the Rosetta mission headed up by the European Space Agency. The goal of the mission is to intercept and orbit a comet, staying with the comet as it swings around the Sun and heads back out towards the outer solar system. This puts Rosetta in position to watch close-up as the comet’s coma, dust tail, and ion tail all develop on approach to the Sun, and diminish after passing by the Sun. A highlight of the mission is the plan to drop a lander, named Philae, onto the surface of the comet. This is planned to happen in mid-November of 2014.

The comet picked for this mission is called 67P/Churyumov-Gerasimenko, being named after the two Russian astronomers who discovered it in 1969. Due to the tongue-twisting nature of that name, it is generally referred to as “Comet C-G”, or “67P/C-G”. (The P in 67P identifies



the comet as a short period (less than 200 year orbit) comet, while The 67 refers to Comet C-G's position in the list of catalogued periodic comets. The most famous, Halley, is designated 1P.)

Rosetta was launched from the European spaceport near Kourou in French Guiana on March 2, 2004. It took one gravity assist from Mars and three gravity assists from Earth to get it into the right speed and trajectory to intercept Comet C-G. Those gravity assists took place between 2005 and 2009. Rosetta went into a "hibernation" state in June of 2011, while it simply used Newton's laws of motion to keep going in a straight line, until it was awakened in January of 2014. Upon awakening Rosetta Tweeted "Hello World!" in 23 different European languages to announce that it was back in action.

Several rendezvous manoeuvres were done between May and August to get Rosetta lined up perfectly and slowed down to intercept Comet C-G, which it did on August 6th. Rosetta is not yet in the grasp of Comet C-G's relatively weak gravity. It is being kept in position, currently about 100 km or 62 miles above the Comet, by a series of thruster burns, repeated every Wednesday and Sunday. The goal is to gradually decrease the distance above the comet until it gets down to about 30 km above the surface, when it gets captured by the comet's gravity. That is planned for early September. Ultimately the goal is to get down to 19 km or 12 miles, which will permit keeping Rosetta on the sunlit side of the comet or orbiting on the terminator line. It will stay in that orbit throughout the rest of the mission, scheduled to end on December 31, 2015. Of course that is the "nominal mission end", but the spacecraft likely will continue hovering around Comet C-G indefinitely, sending more and more data back to Earth.

Comet C-G turns out to be an interesting one to observe. Comets previously seen close-up by spacecraft whizzing by them have had a nucleus shape generally described as "potato-like". Comet C-G's nucleus, as discovered when Rosetta got close enough for close-up images, is described as "like a rubber ducky"! That is, it is composed of a larger and a smaller potato-shaped sections, connected by a "neck". (See image). One of the major tasks that the support team has right now is to determine the best place on the surface of the comet to drop the Philae lander in November.

Comet C-G is roughly 5 x 3 kilometres in overall dimension, or roughly 3 x 2 miles. It orbits the Sun once every 6.45 Earth years. It has been observed from Earth in its orbits with perihelions (closest point to the Sun) occurring in 1969 when it was discovered, then in 1976, 1982, 1989, 1996, 2002 and 2009. That helped the Rosetta team select Comet C-G, since they knew that it was in a very stable orbit and was unlikely to surprise them by shifting its location during Rosetta's 10 year journey to intercept it.

While Rosetta is a European Space Agency mission, NASA has contributed three instruments to it. These instruments and the 18 or so developed by European Space Agency (split about 50-50 between the orbiter and the lander) will provide, among other things, very high-resolution images and information about the shape, density, temperature, and chemical composition of the comet. Rosetta's instruments will analyse the gases and dust grains in the

coma that forms when the comet becomes active, as well as the interaction with the solar wind.

Fred Whipple of Harvard University in 1950 described the nucleus of a comet as “A dirty snowball”. That description pretty well held up until NASA’s Deep Impact mission blasted a projectile into comet Tempel in July 2005. The analysis of the debris from that impact suggested changing the description to “A snowy dirtball”. Data from the instruments on both the Rosetta orbiter and the Philea lander should prove which of these is correct, or perhaps find that neither is correct and give us a whole new concept of the composition of a comet’s nucleus.

I am excited about all of the knowledge we can expect to gain from this mission. Key events coming up include:

- Aug 2014 Start Global Mapping of Comet C-G
- Nov 2014 *Philae* Lands on Comet C-G
- Aug 2015 *Rosetta* & Comet Reach Perihelion (closest approach to Sun)
- Dec 2015 Nominal end of mission

Further details about this exciting mission can be found at

http://sci.esa.int/rosetta/
http://rosetta.jpl.nasa.gov/

Looking Up –September 2014
by Curtis Croulet

First Quarter Moon is on September 2 at 4:11 am; **Full Moon** is on September 8 at 6:38 pm;

Last Quarter Moon is on September 15 at 7:05 pm; **New Moon** is on September 23 at 11:14 pm.

The **Autumnal Equinox** occurs on September 22 at 11:29 pm.

The poor evening apparition of **Mercury** in late August continues through most of September. It’ll be at its greatest elongation (i.e., angular distance from the Sun) on September 21.

Venus is slowly diving towards the Sun in the pre-sunrise sky. It's at magnitude -3.9. Venus reaches superior conjunction with the Sun on October 25.
Mars moves out of Libra into Scorpius. The so-called Red Planet is too small to show detail in our telescopes.

We're losing **Saturn**. The ringed planet sets about 2 hours after sunset by the end of September. But conjunction with the Sun isn't until November 18.

Jupiter is in the morning sky.

Uranus and **Neptune** are both available during evening hours now. Uranus reaches opposition on October 7. Neptune reaches opposition on August 29. They're in Pisces and Aquarius, respectively.

Pluto is in Sagittarius. It's very faint at magnitude 14.1.

There are two very sparse **meteor showers** in September: the Aurigids, peaking on September 1, and the Epsilon Perseids (not to be confused with August's Perseids) peaking on September 9.

Let's look up.

Let's look at Neptune. Neptune should be visible in ordinary birding binoculars, but it's a lot easier to see and identify with a telescope. You don't need a big telescope, but you'll need more than the naked eye. Neptune is magnitude 7.8. Neptune is currently straight south of the "water jar" asterism of Aquarius. That's the three-bladed "propeller" south of Pegasus's head. Neptune is currently northwest of the 5th magnitude star Sigma Aquarii. In my scopes, Neptune has always looked like a tiny, pale blue dot, slightly larger and fuzzier than a star. I usually have to crank up the magnification to verify that it's Neptune and not a star. The September 2014 issue of *Sky & Telescope* has finder charts for both Uranus and Neptune (pp.50-51). You can access some even nicer charts on *S&T* 's website.

Neptune is the eighth planet from the Sun. It's also the last planet outward from the Sun. Neptune is 30 times farther from the Sun than from the Earth. Neptune's orbital period is 164.79 years, and its rotational period is 16.1 hours. The tilt of Neptune's axis is about 29.5 degrees. Earth's is about 23.5 degrees. Neptune is about 31,384 miles in diameter, or almost 4 times as big as the Earth. Neptune has 17 times the mass and 58 times the volume of the Earth. Neptune's iron and magnesium-silicate core is about the mass of the entire Earth. Neptune's atmosphere is mostly hydrogen, helium, and methane. Under the atmosphere is a slushy mix of water, ammonia, and methane. Neptune's atmosphere experiences winds up to 1,500 miles per hour, which are the fastest in the Solar System. In 1989 the Voyager 2 spacecraft imaged a "Great Dark Spot" on Neptune, which, however, later disappeared. Neptune's magnetic field is about 27 times more powerful than the Earth's, and its magnetic axis is tilted 47 degrees to its rotational axis.

Neptune has thirteen known moons, the largest being Triton, which was discovered only a few days after the planet's discovery – of which more anon. Triton revolves around Neptune in the "wrong" direction, opposite other moons in the Solar System. It may be a captured dwarf planet. Triton is the only one of Neptune's moons massive enough to be a sphere.
Neptune also has a ring system. There are three main rings, and they form discontinuous arcs. The arcs may be caused by gravitational effects of Neptune's moon Galatea. The rings are unstable, meaning they are decaying. Perhaps some unknown process renews them occasionally.

The discovery of Neptune was a triumph of 19th Century mathematics and astronomy, but it has also been mired in controversy and nationalism since Galle first identified Neptune in 1846. Neptune's discovery goes back to the discovery of Uranus in 1781 by William Herschel. As astronomers followed Uranus and plotted its position, it was seen to be moving faster than had been predicted under Newton's Laws of Gravitation. After 1821 Uranus appeared to lag. Several astronomers thought that there might be another planet beyond Uranus. In 1841, John Couch Adams, a mathematics student at Cambridge, tackled the problem. Through an intermediary, James Challis, he obtained some data from England's Astronomer Royal, George Airy, to permit his calculations of the position of the possible new planet. Due to a series of miscommunications and Adams' timid approach to Airy, the Astronomer Royal couldn't be persuaded to give the matter much attention. In the meantime, Adams recalculated the planet's position several times, each time with differing results.

Airy's wake-up call came when the French mathematician Urbain Jean Joseph Le Verrier published his own, independently-derived calculations of the new planet's position. Airy asked Challis to conduct a search with the 11-inch refractor at Cambridge. But events roared past Airy and Challis like a runaway train. Le Verrier had encountered disinterest at the Paris Observatory comparable to Airy's in England, so he contacted Johann Galle at the Berlin Observatory to hunt for the planet. Galle obtained permission from the observatory's director, Johann Encke, to use the observatory's 9-inch refractor for the search. On the night of September 23, 1846, with the assistance of Heinrich d'Arrest, Galle quickly located the new planet within a degree of Le Verrier's predicted position. Seventeen days later, William Lassell discovered Triton.

Airy and Challis were widely criticized for their lack of urgency, for letting the discovery slip away. Airy responded that it wasn't his job to hunt for planets. The British astronomy establishment then claimed that Adams should be given joint credit for Neptune's discovery. The French resented the Brits' attempts to usurp their glory. Adams himself gave full credit to Le Verrier. Ironically, Challis at Cambridge *did* see Neptune during his search before Galle's discovery, but he didn't recognize it. In fact, Galileo had seen Neptune as far back as 1612, but he didn't know it was a planet.
Clear skies.

Quiz Answer

Planets (except the Earth) are named after Roman Gods. Who or what are the moons of each planet named after?

First off, I was not exactly correct in my question. Uranus is named after the Greek god personifying the sky or heaven, often called Father Sky. His Roman equivalent is Caelus.

Now for names of moons:

Mars : Characters in Greek mythology who accompanied their father, Ares, into battle.

Jupiter : Mythological Greek characters who have some connection to Zeus.

Saturn : Greek Titans, more recently named for Gallic, Norse and Inuit giants.

Uranus : Characters in the works of William Shakespeare and Alexander Pope.

Neptune : Greek water nymphs and other Greek sea gods with a connection to Poseidon.

Pluto (for extra credit) : Greek mythological characters connected to the underworld.

Quiz

I was discovered by Giuseppe Piazzi in 1801. For a while, before the discovery of Neptune, I was considered the 8th planet. I am the largest object in the asteriod belt between Mars and Jupiter. Later on, I joined Pluto as a dwarf planet. Who am I?

If you know the answer (without Googling it!) post it to <tva@mrh.org>.

Art's Night Out
Article 151 September 2014

Last month I had us looking in and around the constellation Scorpius. We had the pleasure of viewing a few nice globular clusters and a couple of beautiful open star clusters. As I had mentioned, this time of year is a great time for getting out a good pair of binoculars and gaze through our Milky Way Galaxy with its mass of stars, nebulae and star clusters. I hope you've been enjoying our night sky.

Tonight I'd like us to view objects in the constellation Sagittarius. Sagittarius is located to the left of Scorpius. It is identified by the 'asterism' called "The Tea Pot". This 'Tea Pot' is easily recognized in our southern sky. It has four stars forming its body. There are two stars forming its 'handle' on the left of the body. There is one star to the right of the body forming its 'spout'. And, there is one star up from the body forming its 'lid'.

As a reminder, viewing most of the objects we look at is best performed in dark skies. Areas like the desert away from cities or areas like Anza out in the country make great 'dark sky areas'. If you don't have the ability to get out into dark sky areas, then the next best thing for us who stay here in Temecula and Murrieta skies is to view when there is no moon up and the sky is calm and clear. Most of what I observe for these articles is seen from my front yard.

I'd like to start our viewing by looking near the 'lid' star. This is star Gamma for those of you who have a star guide with you. If you look to the left of that star about 3 degrees, and up about 1 degree, you should be able to see a beautiful globular star cluster called M-22. This cluster is one of the larger globular clusters in our viewing skies. This one is an easy binocular find, as well.

Look back at the 'lid' star again. Now, look up and right about 1 degree in each direction. Here you should see another globular cluster called M-28. This is not as bright nor as large as M-22. However, this one is still a nice view.

I usually use my 4.5" refractor when looking for the objects for my article. With this telescope, I start out using my 22 mm eye piece, which gives me about 35 power. This gives me a pretty good wide angle of view in the sky. Most objects I use in my articles are seen at this power. In some cases, I'll up my power to 50 or 75 to get a little more detail out of the object. For the globular clusters in Sagittarius I am using a 16 mm eyepiece which yields just about 50 power.

Look at the bottom two stars of the body or 'pot' of the 'Tea Pot'. These two stars are Zeta on the left and Epsilon on the right. If you look about ½ the distance, in a straight line, between these two stars, you'll see another small hazy ball. This ball of haze is a globular cluster called M-70.

Now look half-way between M70 and the star Epsilon (right star). Look up about 1 degree and you should find M69, another globular cluster. This one is a little brighter than M70 and looks about the same in brightness.

You may want to start by using a pair of binoculars with this next object. Look back at star Zeta again. Now, look to the left about 7 degrees. Move your binoculars or telescope up and down in this area. You just might see another globular cluster in this area. It is a little brighter than the last two and is called M-55. This one is really a nice view. Try increasing your power on this one. You can 'resolve' or see several stars in this cluster.

Before we leave this area of the constellation, let's find one more globular cluster. I almost forgot about this one. Look back at star Zeta again. Now look towards star M70 about 4 degrees. M-54 will be seen in this area. It is about as bright as M70 and about the same in size. There are several visible globular clusters in and around Sagittarius that require the darker skies to find. If you are in a dark-sky area, take the time to find some of these. You will need a star guide to find their locations. See how many you can find.

Last month in our TVA monthly meeting Tim, our vice-president, presented a description of the area to the right and up from Sagittarius. In this area are numerous nebulae (gaseous clouds) and open star clusters. This area is a great viewing area for binoculars. The nebulae are best viewed using a 'nebula filter'. As mentioned before, I use an 'O-III'. Nebulae are also best viewed in dark-sky areas.

Before we get started viewing the objects in this area, I want to give you the opportunity to get a nebula filter. Your viewing pleasure will be greatly enhanced if you do. If you don't have a nebula filter available, a moonless, clear night will still give you a great viewing experience.

Until next time, Art