July-August
2015
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Issue 4

The Observer

The Newsletter of Central Valley Astronomers of Fresno

In this Issue:

Two good objects to view during this summer- Saturn and M13

Observer Object of the Month

Alberio, "the eye of the swan," in the constellation Cygnus or The Northern Cross, scientifically known as Beta Cygni, is arguably one of the most beautiful objects in the nighttime sky. It consists of Alberio A, which is actually a composite of two stars, today known as Alberio Aa and Alberio Ac, with a yellowish-amber color and an apparent magnitude of 3.1. The second star, Alberio B, is a type Be blue star with an apparent magnitude of 5.1. Scientists are still not sure if Alberio is simply a double star system or a true binary. It is 430 light years from Earth

Image from NASA

Astronomy Quote of the Month

"She walks in beauty, like the night
Of cloudless climes and starry skies
And all that's best of dark and light
Meet in her aspect and her eyes
Thus mellowed to that tender light
Which heaven to gaudy day denies..."

Lord Byron, "She Walks in Beauty"

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CVA's Glacier Point Weekend
June 26, 27, and 28, 2015
For reservations, contact Dave Dutton at 658-7642
Or at twodocs@sti.com

Be sure to leave your name, address, phone number, and e-mail address
Also, mention the number of people in your group

Thoughts on Astronomy-and Teaching

On Tuesday evening, June 16, I was at Reedley college with Fred Lusk, Steve Harness, Warren McGuire, and Brian Bellis, showing over 150 Outward Bound students and their leaders the evening sky, mostly Venus, Jupiter, and Saturn. There were a lot of "Ohs" and "Aws" from the teenaged group, as well as the usual ,"That can't be real," and "This is so neat." Unfortunately, the group had a strict timetable, and their viewing was over after about 30 minutes, then off to the dorms(Reedley College is one of the few junior colleges in California that has dorms for students) and to sleep before another day of discovery and adventure.

Afterwards, Fred related that a girl had talked to him; she eventually wants to work for NASA. "Take every math and science class available, and then about the second year of college, start applying for NASA internships," he advised her. Others talked to me about wanting to get their own telescopes, although how many will end up doing that is another question. But the most telling point came after all the kids were gone. One of the Outbound Bound counselors talked to us about our backgrounds. "You must all be astronomers or science people?" she asked. "No," I said, "I'm an English teacher, Fred over there is a civil engineer, Warren is a retired gas station owner, and Steve teaches AVID at Kingsburg High, " Fred chimed in, " Brian does teach physics at Hoover High School." And she wondered about that, talked to us for a few more minutes, then went back to the dorms.

I thought about that for a few minutes as well, and came to a couple of different conclusions. So many of us come from so many different walks of life, and still we are bound together, as people have since the beginning of humanity, by our sense of wonder and awe over what's out there beyond our little blue ball. (I keep thinking of Galileo, who wrote in his journal after viewing Jupiter for the first time though his newly built refractor telescope in 1609: "I have seen the most wonderful things!") We today are no different than ancient men, who, on dark nights, stepped away from their warm and safe campfires, and gazed upwards to try to discern what lay beyond their immediate struggling lives. We are their spiritual descendants, still looking up, still overwhelmed by the vastness of it all, and the surprise and joy of something almost unimaginable, even if it's for the fiftieth time.

The other thing is that, even though we have so many different occupations and skills, we are all teachers. Teaching is not just learning the quadratic equation or the causes of the Civil War or the symbolism in *The Great Gatsby*. Teaching is conveying that sense of worldly imagination and otherworldly wonder to others, to encourage them to look up and connect to something (almost) beyond their imagination. Showing people Saturn or M22 or the Ring Nebula expands their possibilities and promises, visions that are real and not real, that can be grasped and still be mysterious, still wanting more. This is what teachers do to people, young or old.

Having just retired after 34 years in the classroom, I'm realizing that I'll never really retire from teaching, and neither will any of my astronomical colleagues, as along as people want to come out, at Millerton, Riverpark, Eastman, Glacier Point, Reedley, wherever, I once heard a story, that when the original Disneyland was being built in Orange County in the 1950s, a reporter asked Walt Disney when it would be finished. Disney's reply was that, "Disneyland will never be finished as long as there is imagination left in the world." Our real jobs as teachers will never be finished either, as long as people find imagination in the skies above us.

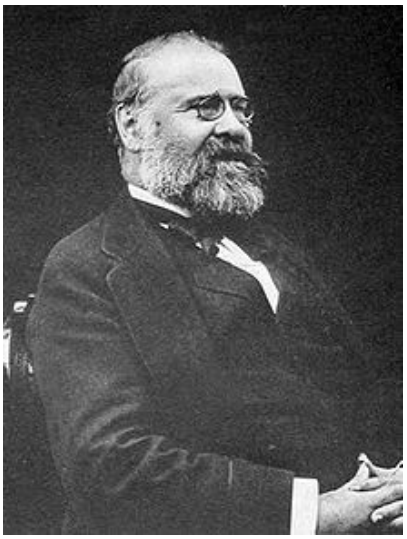
Larry Parmeter, editor of *The Observer*

CVA at Millerton Lake and Reedley College

On June 13, CVA showed up at the Millerton Lake campground-boat dock area to give campers a view of the universe.

On Tuesday, June 17, CVA was at Reedley College to show the skies to over 150 Outward Bound students from Madera. The club will do the same thing with Outward Bound on June 30 and July 14.

Profiles in Astronomy



Georges Antoine Pons Rayat 1839-1906

Rayat was born and raised in Bordeaux, France. He attended local schools, and then continued his education at the prestigious Ecole Normal Supurieure. In 1863, he began his career at the Paris Observatory, where his original interest was in meteorology. Eventually, though, encouraged by Antoine Leverrier, the co-discover of Neptune, he gravitated into astronomy, where he worked closely with Charles Wolf, another French astronomer. Using the newly invented spectrograph, the two men began large scale observations of stars, and in 1867, discovered a new class of high temperature stars, which are now called Wolf-Rayat Stars.

After his and Wolf's discovery, Rayat returned to school, and in 1871, received a doctorate in astronomy, Afterwards, he taught at the University of Marsellies. In 1876, he moved back to Bordeaux, where he became a professor of astronomy at the University of Bordeaux. In 1877, he helped established the Bordeaux Observatory, and in 1881, and became its director, a position he would hold until his death. There he continued his research into stellar properties, discovered several nebulas, a number of variable and double stars, and some comets as well. In 1891, Rayat was awarded the Jannsen Medal, France's highest scientific honor, from the French Academy of Sciences.

Sources--"Necrologie de Georges Rayat," *Astronomiche Nachrichten*, Vol 172, p. 111(1906)
"Georges Rayat," *Wikipedia*

Important Dates During July and August

July 1-Cassini becomes the first satellite to orbit Saturn-2004

July 4-Independence Day

July 14-Mariner 4 flies by Mars-1965

July 16-Comet Shoemaker-Levy 9 crashes into Jupiter-1994

July 20-First landing on the Moon by Apollo 11-1969

August 17-The Martian moons Demos and Phobos discovered by Asaph Hall-1877

Number of extra-solar planets found as of June 2015-1,931
How many more are out there-thousands, tens of thousands?

What's New in Space

Brightman Bows Out

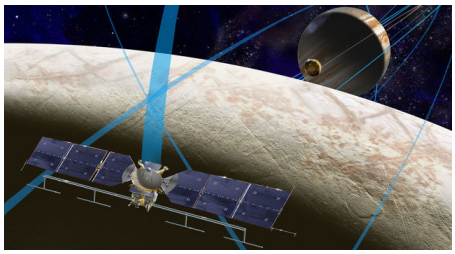
In May, the English actress and singer Sarah Brightman, who had been scheduled to spend a week aboard ISS in September as part of the Soyuz TMA-18M crew, told Russian space officials that she could no longer participate in the mission. Shortly afterwards, she left the Gargarin Space Center, where she had been training for the flight; she gave no reason why she decided not to go after all. Satoshi Takamatsu, a Japanese businessman who had been Brightman's backup, will take her place on the flight as a paying commercial passenger. Takamatsu will be the first commercial paying passenger aboard a Soyuz since 2009; now that American participation in the Soyuz-ISS program is winding down(see next story), more paid commercial seats(at $60 million each) will be opening up aboard Soyuz flights. The reason is simple-the Russian space program needs the money.

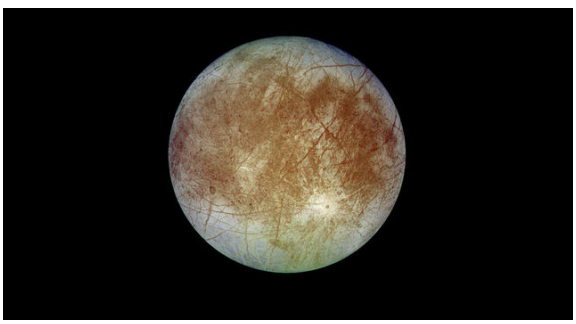
In the Meantime, NASA Looks Beyond Soyuz and the 2017 Deadline

US space officials are now looking beyond 2017, when NASA will need to find another way to send American astronauts to ISS. RKA, the Russian space agency, has already told NASA that the contract to send Americans aboard Soyuz will not be renewed after 2017. At the moment, both SpaceX's Dragon V2 and Boeing's CST-100 are in the development and testing stages; only a month or so ago, Space-X tested the launch abort system for the Dragon V2. Both companies wanted 2015 to be the year to begin manned test flights for their craft; however, all indications are that this will be delayed. Space X now plans the first manned test flight of the Dragon V2 for April 2017, although this could be moved up if all goes well with ground testing. Boeing's first manned CST-100 flight, known as Beo-CFT, is scheduled for July 2017, almost two years behind the original schedule. They both plan to have their craft operational by the end of 2017, but, as with the SS2 crash, any setback could delay that for years to come. In the meantime, NASA has signed a contract with Space X for four Dragon V2 flights, with the first launch date not yet given.

The Europa Orbital Mission Forges Ahead

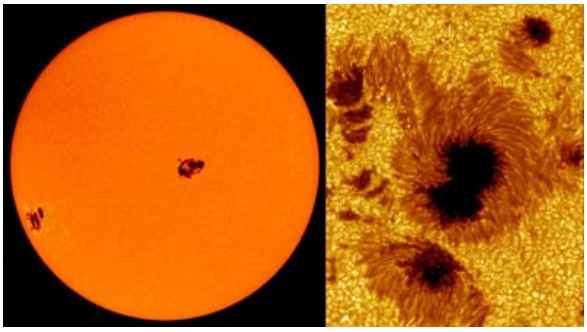
NASA gave the green light for scientists to move to the next phase of its proposed Europa mission, which will study the Jovian moon for possible signs of water-and life. In May, the mission planners chose nine instruments to study the moon; these include high resolution cameras, a spectrograph, ice penetrating radar, a thermal detector, and a magnetometer. Europa has been a primary target of planetary scientists since the Voyager missions of the 1980s, when it was discovered that the moon is covered in ice, with a possible life bearing ocean beneath it. Scientists originally wanted a mission that would land a probe on the surface, which, in turn, would carry another probe that would melt a tunnel in the ice all the way down to the suspected water. It would then release a robotic mini-sub that would explore the ocean for signs of life. This mission is still alive, but is now projected to be far in the future, for the 2030s. As it is, the current Europa mission will orbit the moon, at times coming to within sixteen miles of its surface. No date has been given for the launch of the Europa orbiter, but it is estimated to be approximately 2022-23.





What's The Sun's Mood Today?

From NASA's Space Place



The Sun's core is made of dense, electrically charged gas called plasma. This roiling, boiling plasma generates the Sun's powerful magnetic field. Earth has a magnetic field too. Like Earth's magnetic field, the Sun's magnetic field has a north pole and a south pole. However, unlike Earth, on the Sun the magnetic field is complicated—you might even say messy!

About every 11 years, the Sun's magnetic field does a flip. In other words, the north pole becomes the south pole, and the south pole becomes the north pole.

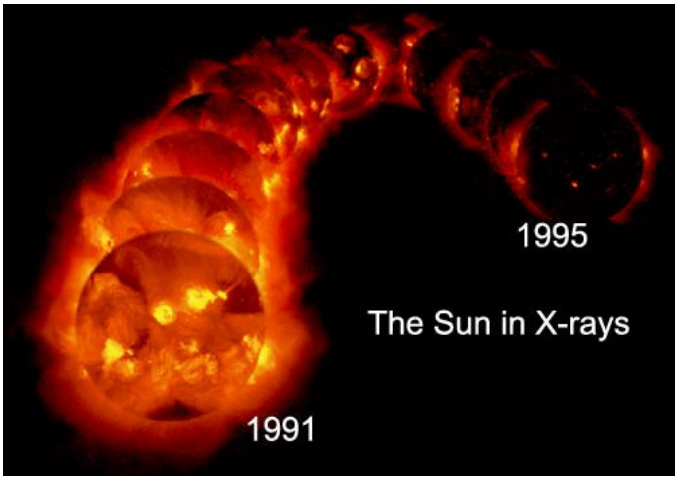
The Sun also does something else every 11 years. Its storminess builds up to a maximum, then it settles back down to a minimum. This repeated behavior is called the solar cycle. When the Sun is the most stormy, that's when its magnetic field flips. Scientists are not sure what the storminess has to do with the magnetic field flipping, if anything.

Sunspots are areas of very strong magnetic forces on the Sun's surface. They look darker than their surroundings because they are cooler. Even so, when there are lots of sunspots, the Sun is actually putting out MORE energy than when there are fewer sunspots. During solar maximum, there are the most sunspots, and during solar minimum, the fewest.
Solar flares happen because of the constantly moving magnetic fields in the Sun's atmosphere. As the Sun approaches solar maximum (the most active part of its 11-year cycle), its magnetic fields become messier and messier. The magnetic fields loop around, and cross over each other, cutting each other off, and reconnecting.

Have you ever tried sprinkling iron filings on a bar magnet? The iron filings line up along the magnetic lines of force. See the picture in the sidebar above.

Similarly, the hot plasma on the Sun's surface is at the mercy of the magnetic lines of force. Sometimes the plasma gets disconnected from the magnetic fields when the fields come together. Then particles in the hot plasma can speed up greatly and send powerful radiation into space. This is a solar flare.

When the solar cycle is at a minimum, active regions are small and rare and solar flares do not occur very often. They occur more often as the Sun gets near the maximum part of its cycle.



Sometimes, the Sun throws off huge amounts of matter. These events are called coronal mass ejections, or CMEs. A CME can release up to 20 billion tons of this material! If that material were rock, it would make a mountain roughly 2-3/4 miles across and almost 1/2 mile high!

The material thrown off by the Sun can travel a million or more miles per hour (500 km/second). Solar flares and CMEs are the biggest, most violent "explosions" in our solar system, releasing the power of around one billion hydrogen bombs!

Fast CMEs occur more often near the peak of the 11-year solar cycle. CMEs can trigger major upsets in Earth's magnetosphere. The Sun can eject matter in any direction, and very few of the CMEs will actually run into Earth.

Text and images courtesy of NASA's Space Place

The Vatican Observatory

Part of a continuing series on lesser known, but still important, astronomical observatories throughout the world

The Roman Catholic Church and its headquarters, the Vatican in Rome, would not immediately come to mind(especially concerning what happened to Galileo) when astronomy and space sciences are discussed. But the Church has long been at the forefront of astronomical research, and the Vatican Observatory is one of the oldest scientific institutions in Europe.

Right-the Vatican Observatory's main facility at Castel Gandolfo

The Catholic Church's interest in astronomy goes back to the 1500s, when Pope Gregory XIII authorized the building of the Gregorian Tower at the Collegio Romano in Rome. Here, Jesuit mathematicians led by Christoph Clavius gathered astronomical data to develop the Gregorian Calendar, which is still used in the western world today. This was the real beginning of the observatory, although it was not officially established until 1774, and given the name of the *Specola Vatanica*. The observatory was originally located in The Vatican, but in the mid 1800s, the director at the time, Fr. Angelo Secchi, the famous Jesuit astronomer, relocated it to the Church of St. Ignatius outside the Vatican, due to better observing conditions, and renamed it the College Observatory. In 1870, however, the newly established Italian government took over the observatory and in 1878 nationalized it, calling it the *Observatories al Collegio Romano,* ending the Vatican association. In 1891, Pope Leo XIII reestablished the *Specola Vatanica*, and built a new facility inside the Vatican. By the 1930s, though, Rome's air and light pollution made observing almost impossible, so Pope Pius XI had the observatory moved to Castel Gandolfo, the site of the papal summer residence about 20 miles southeast of the city. In 1961, the same light and air pollution from Rome caused the Vatican to form a partnership with the Stewart Observatory, the Vatican Observatory Research Group, at the University of Arizona, effectively moving its observing facilities and research to the American Southwest.

Today, the *Specola Vaticania* has five telescopes, four of them at the Castel Gandolfo facility: a .4 meter Zeiss refractor(a famous picture shows Pope Paul VI viewing the Moon though this telescope when the Apollo 11 astronauts landed on it in 1969);a .4 meter Zeiss Newtonian double astrograph; a .3 meter refractor double astrograph, which is no longer used; and a .65 meter Schmidt camera. These telescopes, which date from the 1930s and 40s, have been updated with the latest technology, and still do valuable research. The Vatican Observatory's main telescope nowadays, however, is the 1.8 meter VATT(Vatican Advanced Technology Telescope) at Mount Graham in southern Arizona, which has been in operation since 1993.

The *Specola Vatanica's* main offices recently moved from Castel Gondolfo to larger and more modern quarters a few miles away; the observatory is still administered by the Jesuit order, and most of its staff astronomers are also Jesuits. Its research areas run the range from planetary and stellar studies, especially double and variable stars, to cosmology. In recent years, observatory astronomers have won both the Templeton Prize and the Van Biesbrock Prize. The observatory hosts regular workshops and conferences, which attract scientists from thoughout the world. When the observatory decided to relocate its offices a few years ago, rumors spread that it was going to be shut down. Not at all, its director, Fr. Jose Funes, S.J., said; the observatory and the Church are committed to advancing scientific research and education far into the future.

Above-The Newtonian double astrograph

Right above-Pope Paul VI viewing the Apollo 11 landing site with the Zeiss refractor

Left-Stephen Hawking shows Pope Benedict XVI his computerized voice synthesizer at a cosmology conference at the Vatican in 2010

Right-the 1.8 meter VATT at Mt. Graham in Arizona