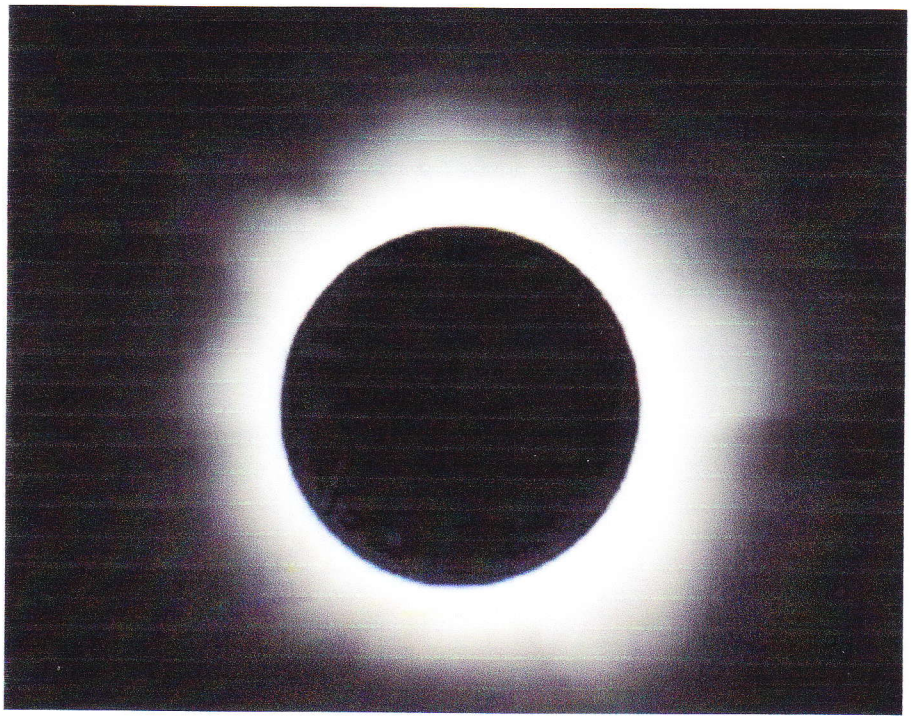
THE OBSERVER

The Newsletter of Central Valley Astronomers of Fresno

July-August 2017



The August 21, 2017 Solar Eclipse is almost Here!

So many of us have waited so long for it

The sun also ariseth, and the sun goeth down, and hastens to his place where he arose...

Ecclesiastes 11:7

In This Issue:

Central Valley Astronomers

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To all CVA members-

Wherever you are on August 21: Oregon, Idaho, Wyoming, Missouri, Illinois, or even Fresno-document your observations and activity at your site. In the fall, I will ask for images and descriptions of the eclipse, which will go into an Observer by the end of the year. So, take pictures and write down your impressions, no matter where you are. In September, I'll come looking for you!

In the meantime, CVA has lots of summer activities: Millerton Lake, Reedley College, Eastman Lake, the Discovery Center, and many more. See the activities calendar at the CVA website.

There will be no September -October Issue of the Observer. Instead, a Fall 2017 issue will be released on

October 15 with images and commentary on the August solar eclipse

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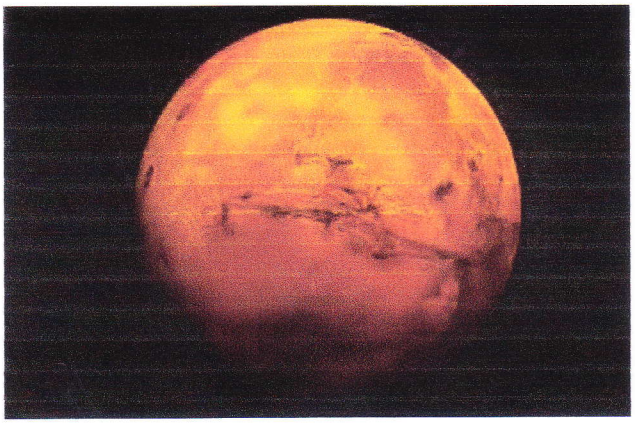
Number of extra-solar planets found as of June 2017-3,614

How many more are out there-tens of thousands?

Hundreds of thousands?

Why We Should Go To Mars



In the June 24, 2017 edition of the Fresno Bee. *Dr. Andrew Fiala, professor of philosophy and ethics at California State University, Fresno, wrote in his weekly column that projects encouraging human exploration and habitation of Mars, especially Elon Musk's proposal to colonize the planet, should not be attempted until problems here on Earth, such as poverty, economic inequality, racism, pollution, and so on, have been eliminated. He claimed that these are moral issues that humanity needs to solve before going on to other planets. I strongly disagreed with his position, and wrote an essay outlining my arguments. This is my response, which I have also sent to Professor Fiala.*

In his recent column, Andrew Fiala takes on the subject of Mars exploration and habitation, and essentially says that we should not go to the Red Planet until were have eliminated poverty, disease, financial inequality, and other socio-economic problems on Earth. In short, he advocates that we not go at all. Such thinking is dangerously shortsighted, morally indefensible, and totally wrong.

Dr. Fiala reminds me of the protesters during the Moon Race of the 1960s. The U.S., they claimed, should not go to the Moon until all of its socio-economic and racial problems were eliminated. They said that money for the moon program could be better spent on Earth. They charged that the Moon landings were a giant ego trip for a few privileged people. And they were totally wrong as well(which some of them admitted afterwards). The space budget, then and now, is less than 1% of the total federal budget. If spaceflight were abolished and its funding put into social programs it would last about a day. That's all.

More importantly, Dr. Fiala misses the greatest achievement of the space program. For every dollar spent on spaceflight, the U.S., and the world, has received back over $100 in benefits, everything from biomedical technology and other types of medically related devices and findings, to electronics miniaturization and computerization, to new kinds of composite materials, to numerous life-saving and safety devices that have made life so much better and safer on Earth. As more than one expert has put it, the space program is the best investment this country has ever made. There is no reason to believe that a Mars venture will be any different; in fact, dozens of new technologies have already sprung up in anticipation of eventual Mars missions, such as new ways of growing food, cost-effective transportation and habitation, continued improvements in electronics and communications, research into physiology and mental health, compact and low cost energy sources, and many more. These are discoveries that can only help make life better here on Earth, as well as aiding people to go to Mars.

Even more so, the world has come of age in the space era. When the images of Earth taken from the Moon by the astronauts were released, they showed a beautiful blue and white ball in the vastness of the cosmos. The Earth was seen as a cocoon, a protective shell, "Spaceship Earth" in the words of Buckminster Fuller, the great engineer and visionary. The beginnings of the environmental movement dates from these images. People saw a whole new way of looking at their planet, and much as they lauded the Moon landings, they learned to appreciate Earth more as well. Human journeys to Mars will not only accelerate this philosophy, but make Earth even more special as well. An image taken by the Voyager spacecraft looking back at the solar system in the 1990s shows Carl Sagan's "pale blue dot" standing out among the blackness of space. No matter where humanity travels in the cosmos, Earth will always be the guiding point, the fixed star that will remind people of their origins and commonality.

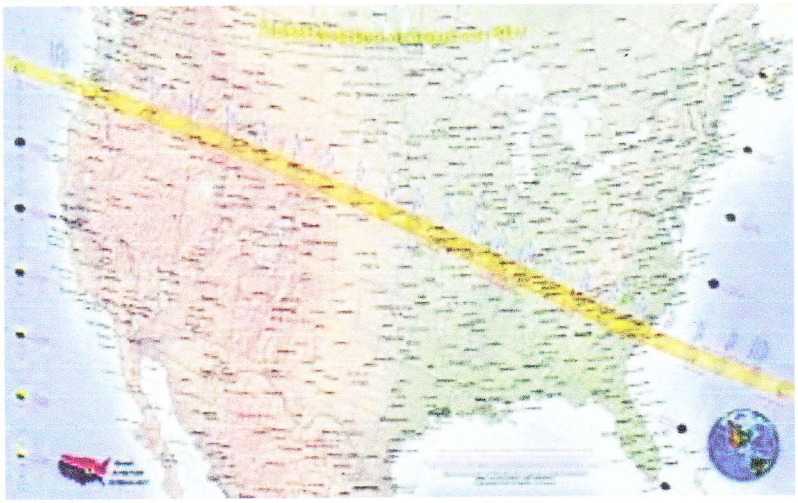
Yes, when humanity emigrates from Earth to other planets, some will left behind. But this has been the history of human movement from the earliest ventures to migrations today. There are those who want to test the unknown, while others have no wish to do so, or cannot. Should the people with vision and imagination and drive be held back as a result? Should all that they have to offer to those who are less fortunate be denied? If so, as Dr. Fiala believes, then the promise and hope of new ways of solving problems, new types of technologies, new visions of seeing the Earth will be lost. It would be akin to the fall of the Roman Empire and the slipping of Europe into the Dark Ages, when almost nothing of consequence, from literature and art to science and engineering was accomplished. It was an age of blindness, when so much to improve human life could have been achieved. Instead, life and culture degenerated, and people lived in fear and hardship. The refusal to advance humanity and go to Mars will likely produce the same results.

Traveling to other planets, and in particular, going to Mars, is humanity's fate. Daniel Goldin, the former head of NASA, once said, "We are explorers. It is written in our genes." Mars has been our target since the earliest civilizations first noticed it, and we are now the first generation that has the technological capability to travel there. Again, some will be left behind, and that may not be fair. But evolution is not about fairness. It's about realizing the potential of the species. Denying that potential, making excuses for not fulfilling it, inevitably means that we will be willing participants in our own demise, which helps no one, and harms everyone. And that's about as immoral as anything can be.

Mars is the next step in our evolution. It beckons us. If we are to grow and mature as a species, we need to break the constraints of Earth and leave it, as clearly as children eventually need to leave their parents and find their own way in the world. Traveling to and living on Mars is humanity's destiny, one that was foretold thousands of years ago and is now on the edge of fruition.

We need to go to Mars.

The August 21 Eclipse



Everyone should be familiar with the path of the August 21 eclipse. But here it is again.

The best viewing area will be in northern Oregon, although good viewing is predicted across most of the U.S. As of late June, the Madras area is expecting tens of thousands of people: professional and amateur astronomers, students, and the general public. Most motel and hotel rooms have been booked up for some time, and those few that are still available are charging three-four times their usual rates.

The site with the longest totality time will be near Carbondale, Illinois. In fact, the eclipse is going directly over the campus of the University of Illinois at Carbondale. The physics and astronomy department at the university has invited scientists from throughout the world to use its facilities and equipment to study the eclipse.

According to meteorologists, the day should be mostly sunny, with the possibility of thunderstorms in the southeast in the afternoon. Those, however, may hold off long enough to have good eclipse viewing before it goes out into the Atlantic Ocean.

Profiles in Astronomy

Knut Lundmark 1889-1958

Knut Lundmark was born and raised in Albsbyn, Sweden, and received his education in mathematics and astronomy at Uppsala University. Afterwards, he came to the United States and spent his early career at Lick Observatory, and later Mt. Wilson Observatory. In 1929, he returned to Sweden, where he became professor of astronomy and director of the Lund University Observatory, positions he held until his retirement in 1955.

Lundmark was one of the first to postulate that the so-called "spiral nebulae" were actually galaxies in their own right and were outside the Milky Way. In 1919, only a year out of graduate school, he measured the distance to M31, the Andromeda "Nebula," using the absolute magnitudes of several novas, and found it to be over 600,000 light years from Earth. With his data, he implied, but never came right out and said, that the "spiral nebulae" were independent of the Milky Way. Lundmark's findings were later used by both Shapley and Curtis in their famous debate over the nature of the spiral nebulae in 1921. Edwin Hubble would also use Lundmark's discoveries in his own studies of M31, which eventually led to his declaring in 1925 that the nebulae were "island universes" far beyond the Milky Way.

Lundmark spent the rest of his career studying galaxies, and, among other research, found that most galaxies have vast amounts of dark material which blocks some of their light and skews measurements relating to light magnitudes and intensities. This would lead to findings of dust lanes and clouds of gaseous material in many galaxies. He was also a popularizer of science and astronomy in his native Sweden, appearing on radio and TV shows and writing books intended for the general public.

A crater on the Moon, a minor planet, and a galaxy are named after Lundmark.

Content and image from Wikipedia

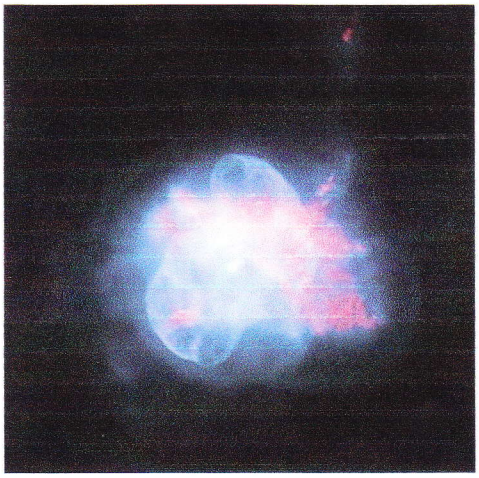
Lundmark with the many honors he earned as a college student

Five Lesser Known but Good Summer Objects

M54 in Sagittarius. One of the lesser known globulars in Sagittarius, it also has the distinction of, according to most scientists, being an extra-galactic object, and is now considered part of the Sagittarius Dwarf Elliptical Galaxy. It is approximately 87,000 light years from Earth and has a magnitude of 8.3

(Right) NGC 6124 in Scorpus. This is a small open cluster with about 125 stars. It was first seen in 1751 by Lacaille in South Africa. It is about 18,000 light years from Earth and has a magnitude of 5.8

(Left) NGC 4605, a barred spiral galaxy in Ursa Major. It is sometimes called Xiuphophorus Ursa Majoris, the "Sword Bearer" Galaxy because of its resemblance to a sword or knife. It is about 4.5 million light years from Earth and has a magnitude of 10.9



(Right) NGC 6210-a small odd looking planetary nebula in Hercules. It is about 6,500 light years from Earth

NGC 5634 in Virgo. Virgo is known for all its galaxies, but it has other interesting objects as well, and 5634 is one of them. This is a globular cluster about 82,000 light years from Earth, with a magnitude of 10.

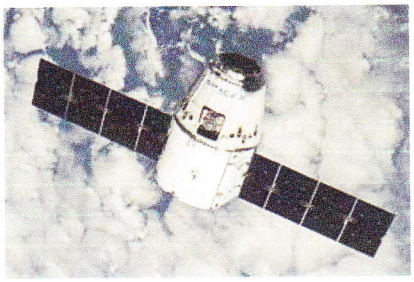
All images from NASA/HST

Content from Wikipedia

There's not much going on in the space activity report for this issue

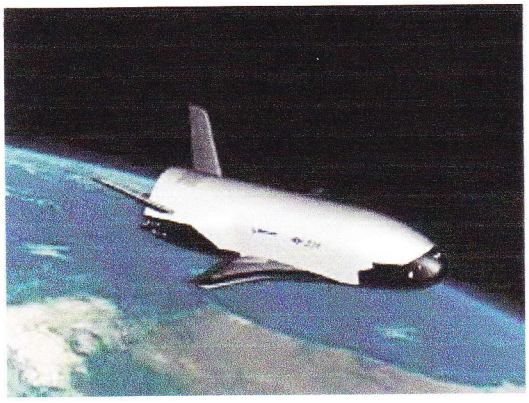
What's New in Space

On June 7, NASA announced the Class of 2017, twelve astronaut candidates chosen from more than 18,000 applications submitted in Spring 2016. The group, seven men and five women, will join the 44 current members of the astronaut corps in Houston later this year. They range in age from 29 to 42 and include an MIT professor, a submarine nuclear reactor specialist, a geologist, two doctors and a surgeon, a systems engineer for Space X, two Air Force test pilots, and a Marine Corps helicopter pilot. This is the first class of astronauts chosen since 2009.



On June 4, Space-X successfully launched a Dragon cargo spacecraft to ISS. What made this mission special was that the Dragon had been deployed on an earlier ISS mission. Also, the Falcon booster, after launch, landed successfully on a barge, and will be used fro a future launch. The mission was not only to deliver supplies to ISS, but also show the Falcon-Dragon system's reusable capabilities.

Virgin Galactic's VSS Unity, the first human-rated Spaceship 2, made its first test glide flight from the Mojave Spaceport on May 1. According to VG and Scaled Composites, the flight was a complete success. A VSS Unity powered flight may occur by the end of this year. Reports say that Virgin Galactic is projecting the first manned commercial flights in late 2018 or early 2018, almost six years behind schedule. Some VG customers have been waiting fifteen years for a chance to go into space.



The X-37B, the Air Force's secretive robotic mini-space plane, landed successfully at the Kennedy Space Center on May 7. The news media was able to photograph the spacecraft when it landed, but, as usual, the Air Force did not give any details on what it was doing while orbiting the planet for almost two years. The Air Force did not give a date, but the next X-37B mission is expected to be launched sometime in the fall. The X-37B was built by Boeing's Phantom Works and is launched by an Atlas 5 booster rocket.

ISS will get incredible views of the solar eclipse on August 21.

From NASA's Space Place

The Fizzy Seas of Titan By Marcus Woo

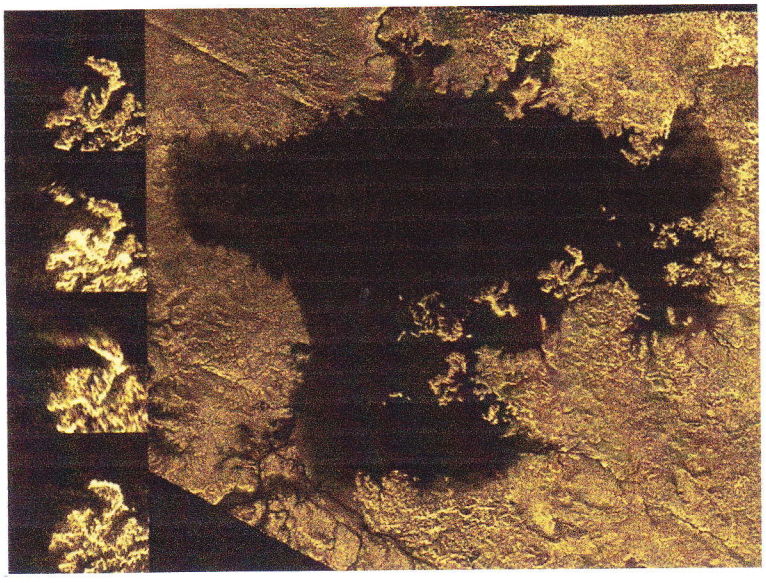
With clouds, rain, seas, lakes and a nitrogen-filled atmosphere, Saturn's moon Titan appears to be one of the worlds most similar to Earth in the solar system. But it's still alien; its seas and lakes are full not of water but liquid methane and ethane. At the temperatures and pressures found on Titan's surface, methane can evaporate and fall back down as rain, just like water on Earth. The methane rain flows into rivers and channels, filling lakes and seas.

Nitrogen makes up a larger portion of the atmosphere on Titan than on Earth. The gas also dissolves in methane, just like carbon dioxide in soda. And similar to when you shake an open soda bottle, disturbing a Titan lake can make the nitrogen bubble out. But now it turns out the seas and lakes might be fizzier than previously thought.
On Titan, the liquid methane always contains dissolved nitrogen. So when it rains, a methane-nitrogen solution pours into the seas and lakes, either directly from rain or via stream runoff. But if the lake also contains some ethane—which doesn't dissolve nitrogen as well as methane does—mixing the liquids will force some of the nitrogen out of solution, and the lake will effervesce. "It will be a big frothy mess," says Michael Malaska of JPL. "It's neat because it makes Earth look really boring by comparison."

Bubbles could also arise from a lake that contains more ethane than methane. The two will normally mix, but a less-dense layer of methane with dissolved nitrogen—from a gentle rain, for example--could settle on top of an ethane layer. In this case, any disturbance—even a breeze—could mix the methane with dissolved nitrogen and the ethane below. The nitrogen would become less soluble and bubbles of gas would fizz out.

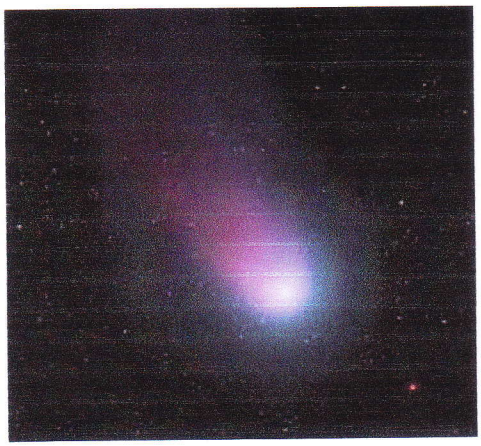
Heat, the researchers found, can also cause nitrogen to bubble out of solution while cold will coax more nitrogen to dissolve. As the seasons and climate change on Titan, the seas and lakes will inhale and exhale nitrogen. But such warmth-induced bubbles could pose a challenge for future sea-faring spacecraft, which will have an energy source, and thus heat. "You may have this spacecraft sitting there, and it's just going to be fizzing the whole time," Malaska says. "That may actually be a problem for stability control or sampling." Bubbles might also explain the so-called magic islands discovered by NASA's Cassini spacecraft in the last few years. Radar images revealed island-like features that appear and disappear over time. Scientists still aren't sure what the islands are, but nitrogen bubbles seem increasingly likely.

To know for sure, though, there will have to be a new mission. Cassini is entering its final phase, having finished its last flyby of Titan on April 21. Scientists are already sketching out potential spacecraft—maybe a buoy or even a submarine—to explore Titan's seas, bubbles and all.



Article and image courtesy of NASA's Space Place

Astronomy Short



The word *comos* is Latin for "hair." Thus, we get the modern word *comb,* which we use to arrange our hair(those of us who have it). Likewise, in astronomy, *comos* is used on a number of occasions. We get the word "comet" from this Latin term because to the early peoples, a comet looked like long flowing hair traveling through space. Likewise, the constellation Coma Berenices, literally, "Berenice's Hair," reminded the ancients of the long hair of Berenice, a queen of Egypt in Ptolemy's time, c. 150AD. It was Ptolemy, in fact, who named the area of the sky after the queen. However, it did not become a full-fledged constellation until 1602, when Tycho Brahe listed it in his catalogue of stars and constellations. Anyway, we own the name to our Latin heritage.

The Big Bear Solar Observatory

Another in a continuing series on lesser known-but still important-observatories throughout the world

Most scientists and amateur astronomers in California are familiar with the major observatories in the state: Mount Wilson, Palomar, and Lick. However, a host of small, less known ones exist as well, and one of them is the Big Bear Solar Observatory, in the San Bernardino Mountains about eighty miles east of Los Angeles.

The BBSO, as it is known, was established in 1968 by the California Institute of Technology. Its primary purpose was, and still is, solar studies, To this end, it was built about two hundred yards from shore at the north end of Big Bear Lake. This was an ideal situation for solar observing, due not only to the altitude, 6,700 feet above sea level, but also for the fact that the surrounding water helps keep both the telescopes and the immediate atmosphere cool and stable for viewing. After heavy storms in 1969 flooded the original construction, the observatory building was rebuilt and a causeway was also built to make access easier. Originally, the facility had three telescopes: a.65 m reflector, a .24 m refractor, and a .2m refractor, all modified for solar studies. In 2007, the main facility was rebuilt, the three telescopes were removed, and two new ones took their place: a 1.6m reflector and a .1m refractor. They are still in use today.

Today, the observatory is managed by the New Jersey Institute of Technology, which took it over in 1997, with funding from NASA and the National Science Foundation. The University of Hawaii and the Korean Astronomy and Space Science Institute are also partners in the observatory.