ASTRONOMY DAY 2019
By Mary Ducca

On Saturday, April 13, we held our annual Astronomy Day. As we have been doing for the past several years, we split the event between two locations. Astronomy-related activities were held from 1:00 – 4:00 pm at Trailside Nature & Science Center on the Watchung Reservation located in Mountainside, and then in the evening, from 7:30 – 10:30 pm, we were back at Sperry Observatory for a presentation, door prizes, and observing through our two large telescopes. Our theme this year was “One Giant Leap”, celebrating the 50th anniversary of the first Moon landing and walk.

The day dawned with some clouds but also sun. What a relief, as two of our activities at Trailside were to be held outside. One is Safe Solar Observing headed up by Bob Ruggiero. Solar Observing has been held at Astronomy Day almost since we started holding the event at Trailside. Bob was assisted by Elaine Scala and some other members of AAI throughout the afternoon. Over three hundred members of the public stopped by to do solar observing. The other activity is the Solar System Walk created by Steve Lowe. It consists of signs that have a picture and information for each planet. The signs were spaced out to show the distances between the planets based on a proportional scale. It was a long walk to get to Neptune! And Pluto (not included) would have been outside of the Watchung Reservation grounds! This was the second year that the Solar System Walk was set up. Thank you to Steve Kozma who was stationed at the walk. He talked to the public and provided them with information on how the walk works and encouraged them to walk to each sign. Over 150 people participated in the Solar System Walk.

Inside the Trailside Museum, we had several activities for both children and adults. There were two short Space Talks held in the auditorium, “Visiting the Moon” presented by Mike Gironda and Joe Arcaro, and “Staying...
Safe in Space” presented by Kathy Wydner Kawalec. Each talk was given twice during the afternoon. This allowed the public to sit in on a talk but also take advantage of participating in the other activities held throughout the museum. Once again we had our own Al Witzgall give his amazing presentation on “Meteorites, Stones from Space” in the auditorium. Holding this event in the auditorium allowed for more of the public to attend. Al asked for four young volunteers from the audience to help him with his presentation. Each was awarded a small meteorite. However, since there were actually five who had volunteered, Al also presented the fifth volunteer with a small meteorite following the presentation. Thank you, Al, for including her. It made her day!

In addition to the talks, there were several other activities inside the Museum. Shelley Shafferly researched and found an activity called Moon Mission that shows children in an easy-to-understand and fun way how we got to the Moon. It was held in one of the classrooms and consisted of four stations that the children would cycle through to understand how to get off the Earth, how to land on the Moon, what it’s like on the Moon, and getting back to Earth. She was assisted by AAI members Marc Stobinski and Kathy Vaccari and two high school students. Marc also created and built a gravity experiment, made a short film about crater creation, and provided a lunar landing flag craft. He had assistance from his daughter and grandson for these activities. We hope to have the gravity experiment and the short film at future Astronomy Days. Over one hundred children and adults participated in the Moon Mission. Another classroom held Activities for Young Astronomers. This was headed up by Anthony Rossetti with assistance from his two young daughters, Mia and Cara, and AAI member Judy Waidlich. Anthony researched and found an easy and fun way to demonstrate how rockets work using string and balloons. It was fun to watch the faces of the children as they saw how rockets soared when air from the balloons released the paper rocket on the string. There was also coloring of astronomy-related pictures for younger children. Thanks also goes out to six high school students who volunteered to help. Over one hundred children and adults participated in these activities.

Also held was Story Time. AAI member Sarah Luckenback, assisted by her father, David, read the book “I Am Neil Armstrong” to a young audience. She had two readings and close to twenty children sat and listened about the first man on the Moon, astronaut Neil Armstrong. They also provided coloring of the planets and other astronomy-related pictures for the children. Coloring is always a big hit with younger budding astronomers! For those adventurous enough, there was a scavenger hunt to find pictures of four astronauts displayed throughout the museum.

Steve Lowe came up with another science idea to display for the public called Fantastic Photon. This activity is an experiment Steve created and built to show how spectroscopy works. It was set up outside the auditorium in an open area. Due to the high volume of people stopping by and/or those going in and out of the auditorium for the Space Talks, it was hard to get a count of participants. Suffice it to say that we had a large number of the public at this display. This activity is one that we hope to offer at future Astronomy Days!

At the entrance to the museum, we had a Welcome Desk set up for the public to register for the event. Bonnie Witzgall and Janice Arcaro were stationed there and explained to the public about AAI, Astronomy Day, the activities, and handed out the day’s program and the “passport” booklets to the children. As the children went to each activity, they could get a stamp in their passport to show that they had participated in that activity. When they were leaving, they could show their passport at the Welcome Desk and pick a small prize from a big container. It didn’t matter how many stamps they had in their passport. All got a prize.
As I am still learning about photography and how to use my camera, I walked around taking pictures of all the activities going on. Some of the pictures came out okay and others leave much to be desired! As they say, it is a work in progress.

In the evening, we headed back to Sperry Observatory for a presentation by Al Witzgall on Apollo 11, the first mission that landed on the Moon. After the presentation, we held door prizes for children, which is always a big hit. Thank you to those members who donated prizes and congratulations to the winners! Although the weather was not the best for observing, we did open the 10-inch telescope to view the Moon. Some members also brought their own telescopes and binoculars and set them up outside. We had over 125 of the public attend the evening activities at Sperry Observatory.

Our 2019 Astronomy Day was a very successful event. We would like to thank Trailside Nature & Science Center for letting us use their space and for the publicity they provide. In addition to promoting Astronomy Day, having it at Trailside helps us get the word out about AAI and Sperry Observatory. We also thank all the high school students who volunteered their time. Finally, thank you to those members of AAI who organized the event and/or volunteered their time at Astronomy Day. We are already talking about next year’s Astronomy Day and have a date set for May 2, 2020. Mark your calendars and prepare for our next journey. We hope more members will volunteer next year. It’s always a lot of fun and a great way to meet other members of AAI and share our knowledge and enthusiasm for Astronomy with the public.
Above left: A young participant in the Moon activities. Above right The Solar System Walk. Below left: The "Fantastic Photon" display created by Steve Lowe. Left to right are AAI members Mike Gironda, Steve Lowe and Joe Arcaro. Below right: Joe Arcaro presenting the Space Talk "Visiting the Moon".

Left: Volunteers for the Young Astronomers Activities. In back left are: Anthony Rossetti (sitting) with Judy Waidlich (standing). In the back right are Cara and Mia Rossetti. The others shown are high school volunteers.
Above: Young volunteers for Astronomy Day – mostly high school students. Second and third from the left are Cara and Mia Rossetti, respectively, daughters of AAI member Anthony Rossetti.

Below: Safe Solar Observing. Bob Ruggiero was assisted by Elaine Scala and other AAI members.
STEM GROWS FROM STRONG ROOTS
By Bonnie Burke Witzgall

The two most influential people in my life are now both gone. My Mom, Jean Cassiere Burke, died in June 1991. Her loving husband and my patient Dad, Mike Burke, just joined her in May 2019. Both taught me so many good life lessons, but one of the most important guidelines was to stay curious and gain knowledge of everything you can.

My Mom was Valedictorian of Union Hill High School; my Dad quit high school to join the Army and helped defeat the Nazi’s upsurge in Europe. He was part of the intelligence division in his battalion; constantly doing reconnaissance and “noticing things”. Both their diverse backgrounds helped to shape mine.

Neither of my parents had any schooling beyond high school, but both were devoted to non-fiction books and science programs offered on the radio and through their black and white television. They would drive me with my nature books to northwestern New Jersey to hunt wildflowers. We watched Echo fly over the New York City skyline. We glued ourselves to the big TV console with the small TV screen for every NASA launch broadcast simultaneously shown on the three major New York City stations. They subscribed to the fledgling cable networks, but both my Mom and Dad really enjoyed watching Channel 13, the NYC local PBS station. One of my Dad’s favorite shows was Connections, hosted by Professor James Burke… a famous distant relative perhaps?

Mom liked to tell the story of the day she was banished from her fourth grade classroom. She boldly predicted humans would effortlessly fly in the air using rocket belts and jet packs akin to the old Flash Gordon serials. Her fourth grade teacher denounced the idea and the entire class laughed at this ten-year-old student’s wild intentions. She got mad and sassed back the teacher. Jean Ann was made to leave the classroom and stand in the hall for her insolence. Today brave humans soar above Earth’s mountains wearing those wild avant-garde wingsuits.

Even after Mom passed on, Dad still retained his curiosity and interest in the natural world. He would constantly shower his son-in-law, Al, with a diversity of astronomy questions. Dad was always amazed how the existent technology and real planetary discoveries greatly surpassed the misleading Hollywood versions. One of the last examples of my Dad’s sharp mind and vision was revealed at the end of March 2019. My husband Al and I attended the New Jersey Astronomical Association monthly meeting. This astronomy club’s March meeting coincided with tantalizing and optimistic reports of aurora borealis that might be detectable from New Jersey. Yes, it was high odds to have the Sun’s burst hit the Earth’s magnetic field just right and to have the sky colors venture south to Garden State skies. However, it was worth the gamble, so Al assembled his tripod and camera and waited for the last rays of sunset to diminish.

Meanwhile, I called my Dad at 7:30 pm sharp just as I had at the same time for countless months. I explained that we were at the NJAA observatory and prior to the actual meeting, Al set up his camera to record any aurora blooms. Without hesitation, my Dad said, “Oh, Hon, I don’t think Al will see the aurora.” “The big full Moon will be too bright and wash out all the faint colors in the sky.”
I WAS DUMBFOUNDED! I jumped up and down and yelled in the cell phone, “Oh, Dad, I cannot believe you know this!” “You are exactly right! I cannot believe that you get it!” “Good for you, Dad!”

I was so proud of Dad’s evaluation, so proud of his simple deduction. I could not believe my 95-year-old Dad even noticed that evening’s Full Moon. Then I was shocked that any 95-year-old person still possessed the brain cells to interpret this event and then care enough to give a scientific argument against the photography. Of course, I always knew my Dad’s mind was constantly engrossed. Thanks to Al, my Dad now took note of many objects in the sky, adding to his interest in the physical world. People who visited the NJAA observatory for the first time that night never equated an overly bright Moon with drowning out the predicted aurora… but somehow my Dad did!

Now I imagine Mom and Dad are finally united in Heaven. Al and I still look at the sky and Al still photographs the faint fuzzy night sky objects. I still admire wild flowers and hope to see my parents’ keen spirits in some vivid aurora. I carry Mom and Dad’s teachings in my heart and in my brain. Many times I convey their basic training through my public astronomy presentations and through my designs in the big display case at Sperry Observatory. There is something else my parents taught me. Formal schooling is beneficial when strangers demand to see your diploma. Yet self-interest in a subject and the joy of discovery is thrilling for one’s individual soul. If you exchange such mental magic with a supportive family and some devoted friends, they help you develop your own solid roots and strong wings. You are able to take scientific flight fueled by your mutual knowledge and a fine support team. I’m so glad that Mom’s fourth grade teacher was wrong!

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STARS OVER THE AMAZON
By Kathy Wydner Kawalec

Wow! Those stars are so bright! They’re the brightest stars I’ve ever seen! They almost seem to be glowing rather than twinkling. The sky is so dark around them. There’s the Southern Cross! Was that a shooting star? Yes, I saw it too!

Through breaks in the canopy of leaves overhead, an amazing nighttime spectacle of stars floated above us as our boat drifted slowly along a stream. The stars were not the reason we came to the Peruvian Amazon Rainforest, but they became a breathtaking part of our experience.

My son Joe and I didn’t have the photographic equipment to capture this sky full of stars, but their brightness against the blackness of the skies left a lasting imprint on our memories. Joe and I were part of a group of eight curious explorers, all from New Jersey, participating in an educational trip organized through Saint Peter’s University to learn about the amazing biodiversity, cultures, and importance of the Amazon Rainforest. Our Explorama guide, Cesar, led us on the trip of a lifetime from Iquitos, Peru down the Amazon and up the Napo Rivers. Almost every night for a week, all of us climbed into a small, open boat and drifted along dark channels through flooded forests for nighttime wildlife viewing. Sometimes we came across tree boas, giant fishing spiders, and sleeping butterflies, hummingbirds, and kingfishers, illuminated by the beam of our guide’s flashlight. On one occasion, two of us were attacked by night wasps … but mostly it was good! Bats flew up and down the water-
ways, and a few times we were treated to views of nocturnal birds that were out hunting night-flying insects. Included here is a photo I took of one such nocturnal bird, called a Great Potoo, a very unusual member of the nightjar family.

After we returned home to New Jersey, I did a bit of reading on the Internet to understand more about the brightness of the stars we saw. According to NASA’s publication “Earth Science at NASA: Earth at Night” ¹, the Amazon contains some of the darkest night skies on Earth. This is simply the result of sparse human settlement and low usage of electricity. Perhaps the most famous constellation of the Southern Hemisphere is the Southern Cross (also known as Crux), whose small size made it easy for us to see it through gaps in the trees. The four main stars of The Southern Cross form a cross-shaped or kite-like asterism. Furthermore, each of its main stars has an apparent visual magnitude brighter than +2.8, which essentially means the stars are bright to our eyes. Because of the dark skies in the Amazon, it is easier to see the faint meteors that are drowned out by the light pollution in our local skies.

NASA’s publication states that although “One of the darkest areas of the globe is the Amazon Rainforest of Brazil ... lights are beginning to appear in the region.” Dark skies like those in the Amazon are endangered by the encroachment of the lights of civilization, and this is not merely an aesthetic issue for stargazers. Researchers are becoming more aware of the sensitivity of animals to lights at night. Plants and animals adapted to the Amazon have been living in a world without artificial light for millions of years. Animals that are active at night become disoriented by artificial light and can change their mating, migration, and other behaviors, such as feeding habits.

Our trip to the Peruvian Amazon made us more aware of how special and important the tropical rainforest is to the rest of the world. The dark skies and brilliant stars are a reminder of something that much of the world has lost, and can also be a reminder to protect these amazing and special places and never take them for granted.


Great Potoo
(Nyctibius grandis)
at Ceiba Tops,
June 2019
Loreto, Peru.
Photo by
Kathy Wydner
Kawalec
50th Anniversary
APOLLO 11 Moon Landing

COME CELEBRATE WITH US
Friday, July 19, 2019  Doors open 7:30pm
Free Event   Door Prizes   Free Parking

One Small Step
The Voyage of Apollo 11
By Alan B. Witzgall, AAI
8:30 pm

CHILDREN’S ACTIVITIES
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Upcoming Event:
Saturday, September 7, 2019

Classic Telescope Night

In cooperation with the Antique Telescope Society, AAI is proud to present our first “Classic Telescope Night” featuring telescopes from the 19th and 20th centuries. Recently donated telescopes as well as a few that have not seen starlight in a long time will be set up for your observing pleasure, and there will be a few talks on the history of various telescope makers.

If you have a “classic” in your collection, feel free to bring it for display and viewing.

For more info contact Jim Nordhausen at aldeneastro@gmail.com

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UNIDENTIFIED REFUELING OBJECTS
By Bonnie Burke Witzgall

Stellafane Convention is an annual event held in the Green Mountains of southern Vermont. Sponsored by the Springfield Telescope Makers, it is a four-day retreat of telescope makers, technology devotees, and astronomers of various intensities and degrees. Space studies done by both amateurs and professionals are welcome and addressed here. It’s a blend of all ages and all astronomical relevance in concert, viewing together under the Summer Milky Way.

It was at one of these Conventions that my husband Al and I shared an uncommon encounter with some high-flying objects and Earthly fellow observers. On the first evening, it is our tradition to walk up the mile-long dirt road from the camping area of Stellafane East to the Pink Clubhouse. At this spruce-gum pink-colored building on the Summit, the Springfield Telescope Makers finalize their last minute plans. It also makes a perfect place to view the Sun setting over Mt Okemo.

Just above Mt Okemo remained a few lingering wispy clouds. The clouds were a multicolored mix of silky kitten gray and warm golden peach. Like curtains on a great sky stage, clouds were pulling away, making room for the main event of Summer night stars. Sol had already dipped below the western mountains and its last sunrays were spotlighting the opening act of the Milky Way. The Moon assumed the shape of a thin silver sliver and nearby shone a dazzling Venus.

Several people set up their small refractors to photograph this graceful portrait. Since all astronomers become one family at Convention, Al and I were instantly invited to view the sky show through binoculars and the battery of scopes. As the crowd talked quietly and admired the sky someone broke the tranquility by shouting “Hey, what is that little speck close to Venus?” A small black dot appeared in the sky close to the Evening Star planet. No observer noticed it before; we were all in wonder of the planetary conjunction and no one saw the arrival of this tiny dark spot. Having telescopic instruments at the ready, all scopes turned toward this small speck hanging in the clear firmament. It appeared to be a high flying plane with its distinct shape of swept back wings, fuselage, and jet aircraft tail. A closer look revealed an even smaller dot flying in tandem alongside the tiny plane. There was some sort of slender black line connecting the two bodies as they silently drifted together across the twilight.

As we all viewed this odd arrangement high in the western sky, someone said it must be an air force jet refueling from a flying tanker plane. Someone else mentioned that real refueling only occurs over the ocean and so this must be a practice flight; probably from Pease Air Force Base in New Hampshire. Most people on the Summit said they had never witnessed such an event except in the movies. It was interesting to personally watch this dance of high-flight fueling. Then out of the golden sky, a second array of speck and smaller speck appeared suddenly ….and then another and another. There were now four pairs of tiny black dots peppering the Summer sunset.

All these planes were unidentifiable except through our optical devices. We wondered aloud how many others back in the camping field noticed such tiny things in the sky. Did other attendees use their telescopes to view and identify these dots? People without scopes or binoculars would have no way of probing these pinpoints. They might develop their own tall tales about these soaring sky spots. Our cluster of witnesses at the Summit all agreed. The world needs more telescopes and telescope users. Telescopes would help the rest of the population gain knowledge and dispel the fear of captivating objects that dance in the sky.

The Asterism, the newsletter of Amateur Astronomers, Inc. July 2019
"A long time ago in a galaxy far, far away" is a phrase made famous by Star Wars that has become very real for astronomers. Because light takes time to reach us, looking out into the universe means looking back in time. Modern telescopes get a boost from "cosmic telescopes" -- massive clusters of galaxies whose gravity bends light and magnifies our view of the distant universe. I will show examples of cosmic telescopes observed with the Hubble Space Telescope and discuss how we analyze the distortions and magnifications to study the first galaxies in the universe.
Hello AAI,

I hope all of AAI is having a safe and enjoyable summer. While we may not have our Main Lecture Series talks in the Roy Smith Theatre during the summer, AAI is as busy as ever. Friday July 19 we are celebrating 50 years since Apollo 11 with a special Friday Night program at Sperry Observatory. I hope many of you can come and join us that evening.

Thanks to several donations in recent months, AAI is currently in possession of a few very exceptional antique telescopes. Because of this we are having an Antique Telescope Night at Sperry Observatory. We are planning for a date in early September. More information will be coming out in the near future.

We are rapidly approaching the 70th anniversary of the founding of AAI. We are currently planning on a celebration dinner in November. Anyone who wishes to help with planning and organizing the event please email myself or Mary Ducca.

It is time once again for the AAI Members’ Calendar. We have a great group of imagers and photographers at AAI, but I want to include as many members as possible. If you have an image you would like to send in do not hesitate to contact me. Let’s have another great calendar this year packed with even more members contributing than last year!

Have a great rest of your summer. Hopefully the clouds and storms keep away for great views of the Milky Way. Looking forward to seeing you all soon at the observatory. Clear skies and happy observing!

Aaron Zuckerman
President AAI

**Member’s Handbook**

If you have not already read it, take a look at AAI's Members’ Handbook. It can be found on AAI’s website at [www.asterism.org](http://www.asterism.org). On the Home Page click on About Us and scroll down to Members Handbook. It has a lot of detailed information about our committees. If you have an interest in helping out with any of the committees, please contact the committee chair. We are always looking for volunteers to be a part of these committees. You can find the committee chairpersons on the website. On the Home Page click on About Us and scroll down to AAI People. Then click on the committee you are interested in and you will be able to contact that committee chair. This is another way to meet members of AAI and make new friends!
Some of you at AAI may have noticed that I have not been at the club for quite some time. This is not due to any falling out with AAI. I have some serious health issues and, as a result, do not get around as well as I used to. The last time I was at AAI was when Dale Gary was giving a presentation on the solar magnetic field and I was in considerable pain. While my condition has improved somewhat, it may be a long time before I get back to participating in club activities. However, I can still write the column, so here it is.

The summer of 2019 marks a major 50th anniversary and I am not referring to the 50th anniversary of Stonewall, although the mainstream media thinks that was the big event. I am referring to the more historically significant landing of Apollo 11 on the Moon.

Apollo

The beginning of our effort to reach the Moon can be traced to a speech given by President Kennedy on May 25th, 1961. At that time, there was a major competition between the United States and the Soviet Union in terms of space achievement. The Soviets appeared to be ahead as they had launched Yuri Gagarin into orbit that April. Kennedy, looking for a major goal for our space efforts, stated that the United States would land a man on the Moon and return them to Earth before the end of the decade. At the time, it seemed far fetched since the United States had just launched Alan Shepard on a brief sub-orbital flight on May 5th, and many were skeptical that the deadline could be met.

But NASA threw itself into the effort. The Mercury program continued and proved we could get astronauts into orbit. Then came the Gemini program where many of the skills required for a lunar mission, such as docking spacecraft in space, were learned. In an interesting connection, one of Gemini astronauts on a docking test mission (Gemini 8) was none other than Neil Armstrong. While the docking was a success, the jolt switched on a thruster on the Gemini capsule which caused the capsule to spin. Fortunately, Armstrong was able to bring the capsule under control and made an emergency reentry, saving his life and that of his crewmate.

With the conclusion of the Gemini program, the Apollo program began. This would be the program to go to the Moon. However, it was also far more complex than what came before and had its share of problems.

The F-1 and Werner von Braun

One trouble spot concerned the first stage of the Saturn V, the rocket that would be used for the lunar missions. The first stage was powered by five F-1 engines. These were quite powerful, but had a rather annoying tendency to explode on the test stand. After some analysis, it was found that the problem was due to fuel combustion instability in the engine. Werner von Braun, the chief scientist of the German rocket program in World War II, wound up working for NASA. He recognized the problem as one that
plagued the development of the V-2 missile back in World War II. It turned out that the solution von Braun came up with for the V-2 (use of a different injector design) also worked for the F-1 engine. And it was quite effective. During at least one test, an explosive charge was deliberately set off in the F-1 combustion chamber and the engine instantly compensated for it.

**Apollo 1**
A very serious set of problems for Apollo was discovered in arguably the most horrific way possible. On, January 27th, 1967, tests were being conducted on what would have been the first Apollo mission, an orbital test flight. The three astronauts for the mission, Ed White, Roger Chaffee, and Virgil “Gus” Grissom, entered the command module. One thing that was noticed was that the communications system was working poorly. That might have been a bad omen. In an effort to save time, several tests were to be conducted simultaneously, including a pressure test of the command module. As a result of the combined testing, the module's atmosphere was pressurized with 100% oxygen. Then there was a spark. That instantly set off an intense fire. Due to flaws in the design of the hatch, nobody on the outside was able to open it. All three astronauts were killed. Actual audio from the disaster, which does exist, consists of distorted screams. They died quick but agonizing deaths.

Then there was the analysis of the charred remains of the command module. The cause of the spark was found to be a flaw in an electrical circuit. In the investigation, it was found that the command module had quite a number of problems and necessitated a serious redesign. Apollo 2 through 6 were unmanned tests to make absolutely sure that those flaws were resolved as well as test out other aspects of an Apollo lunar mission.

The first manned Apollo mission was Apollo 7, which on October 11th, 1968 began an 11-day test of the command and service modules in Earth orbit. The mission was a success. The very next flight, Apollo 8, launched on December 21st, 1968 was a flight around the Moon.

**Back in the USSR**
Meanwhile, the Soviet lunar program was nearing its end. The entire plan for a Soviet Moon mission depended on a huge rocket known as the N-1. It was a rather complex machine with a whopping total of 27 rocket engines. However, in all three of its unmanned test launches, the results were the same. The rocket exploded shortly after liftoff. The failure of the N-1 would force the Soviets to abandon their manned lunar program.

**A Weighty Issue**
Another area that gave Apollo some difficulty was the Lunar Module. The challenge was to design a very lightweight vehicle that was sturdy enough to land on the Moon. While the builders of the lunar module were trying to find ways to deal with the weight issue, astronauts needed to be trained on how to fly the vehicle. To that end, the Lunar Landing Research Vehicle (LLRV) and, later, the Lunar Landing Training Vehicle (LLTV) were developed. Both vehicles had a similar design of a spindly framework with an open box-like cockpit for the astronaut. There was a jet engine that gave vertical thrust that canceled out 5/6th of the Earth’s gravity to simulate lunar gravity and hydrogen peroxide rockets to simulate the LM thrusters. While it did a reasonable job of simulating the LM performance, it was a bit tricky to operate. On May 6th, 1968, Neil Armstrong was piloting an LLRV when the engines started acting up. Despite his efforts, Armstrong was unable to regain control and had to eject.

The next two Apollo missions were to test the LM in space. Apollo 9 tested it out in Earth orbit. By the time of the next flight, the weight problems were solved and Apollo 10, which was essentially a rehearsal for Apollo 11, tested it out at the Moon, coming within 50,000 feet of the lunar surface.

**Apollo 11**
The time came for actually landing on the Moon. On July 16th, 1969, Apollo 11 took off and began its trip to the Moon. Arriving in lunar orbit on July 19th, preparations were made for the landing. On the 20th, Neil Armstrong and Buzz Aldrin entered the LM and soon began their descent to the lunar surface.
On the way, the computer system on the LM acted up and set off alarms. This was soon determined to be due to a data overload, and the order was given to disregard the computers.

Further along in the descent, another, more serious problem emerged. The automated navigation program was leading the LM into a field of boulders. Exhibiting his ability to keep a level head in dangerous situations and his superb piloting skills, Armstrong took control of LM and found a safe spot to land shortly before the descent stage ran out of fuel. The rest is history.

After spending about two-and-a-half hours on the lunar surface, Armstrong and Aldrin returned to the LM and soon left the Moon in the ascent stage. Once in orbit, they docked with the command module and got themselves and their lunar samples on board. Then Apollo 11 left lunar orbit and headed back for Earth. They landed on Earth on the 24th and were picked up by the USS Hornet aircraft carrier. Out of extreme (turned out to be excessive) caution, the astronauts had to spend 21 days in a special quarantine chamber. After that, huge celebrations began throughout the world for the crew and their accomplishment.

**Sequels**

There were six more Apollo missions after Apollo 11. While each of these was a bit more sophisticated and had more objectives than the last (Apollo 13 was a notable exception as an explosion in the Service Module forced them to scrap the landing and it was through the heroism of the crew and the resourcefulness of NASA engineers that the crew made it back to Earth), political and public support lessened over time and Apollo 17 was the last lunar mission. Still, these flights marked a great historical era.

☆☆☆
**EMAIL CONTACTS**

**president@asterism.org**  
President of AAI

**editor@asterism.org**  
Editor of *The Asterism*

Kathy Wydner Kawalec, Editor

*Deadline for submissions to the newsletter is ~ two weeks prior to its next publication.*

**membership@asterism.org**  
AAI Membership Chair

**trustees@asterism.org**  
All three Trustees of AAI

**exec@asterism.org**  
Executive Committee plus Trustees

**QOs@asterism.org**  
All Qualified Observers

**info@asterism.org**  
AAI president, corresponding secretary, and computer services chair

**research@asterism.org**  
Research Committee

**technical@asterism.org**  
Technical Committee

**MEMBERSHIP DUES**

- Regular Membership: $25
- Sustaining Membership: $40
- Sponsoring Membership: $55
- Family (12 Years Old and Up): $10
- Youth (Under 12 Years of Age): $5

**Sky & Telescope**: $32.95  
**Astronomy** subscription: $34

*(Subscription renewals to *Sky & Telescope* and Astronomy can be done directly by AAI members. See "Membership-Dues" on website for details.)*

AAI Dues can be paid in person to our Membership Chair, or by mail to: AAI, PO Box 111, Garwood, NJ 07027-0111

**DOME DUTY**

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<td>Team E</td>
</tr>
<tr>
<td>Aug</td>
<td>30</td>
<td>Team A</td>
</tr>
<tr>
<td>Sep</td>
<td>6</td>
<td>Team B</td>
</tr>
</tbody>
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**FRIDAYS AT SPERRY**

**July 19, 2019**  
One Small Step - The Voyage of Apollo 11  
Al Witzgall

**July 26, 2019**  
Saturn – More Results from the Cassini Spacecraft  
Al Witzgall

**August 2, 2019**  
What's Up: A Down to Earth Sky Guide  
Kathy Vaccari

*All schedules above were accurate at time of publication. Please check [www.asterism.org](http://www.asterism.org) for latest information.*

**General Membership Meetings**  
are held the third Friday of each month from September to May.

**On September 20, 2019**  
our next speaker,  
**Dr. Charles Keeton**  
of **Rutgers** will speak about **cosmic telescopes**.

**MEMBER ONLY STAR PARTIES**  
ARE HELD AT  
**JENNY JUMP STATE PARK**  
**HOPE, NJ**  
SEVERAL TIMES A YEAR
Mary Ducca traveled to Tromso, Norway in November 2018 on Dr. Bill Gutsch’s “Northern Lights” trip. These are her photos, taken above the Arctic Circle with a Canon 77D and 18-135 mm USM lens, of the Milky Way and Aurora Borealis.

The Milky Way (above)

Aurora Borealis (next page)