COVID restrictions still in place-See the CVA website for information

THE OBSERVER

The Newsletter of Central Valley Astronomers of Fresno September-October 2021

What is an Astronaut?

Only a few days after Richard Branson's July 9 Virgin Galactic flight to 54 miles above the Earth and on the day, July 20, that Jeff Bezos and three other passengers flew to 65 miles above the surface, the Federal Aviation Administration changed its definition of who will earn astronaut wings and who will not. Before, all a person had to do was fly 50 miles or higher above the Earth's surface. Now, the FAA requires that participants show evidence of advancing technological or scientific knowledge that will help future space endeavors(one of the passengers aboard Branson's flight, Sirisha Bandla, initiated a botany experiment sponsored by NASA and the University of Florida, so *maybe* that counts, but all the other passengers on both missions were just along for the ride) before they can be designated as astronauts. So, none of the participants, with the exception of the two pilots on Virgin Galactic, aboard both missions were given official astronaut status by the FAA.* Bureaucracy marches on, even in space.

Quote of the month-

"As much as you prepare, the day-to-day life(in space) can still be challenging"

-Megan McArthur aboard ISS, August 2021

In this Issue-

Central Valley Astronomers

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The President's Report:

Instead of a regular president's message, Ryan Ledak has written a kind of personal memoir about his astronomical experiences.

The People You Surround Yourself With

I have been observing the night sky for a while now. Ever since I was a kid, I've been enamored with the subject of space. Most of the cartoons I watched were space based adventures. My family were total Trekkies. I would read my dad's issues of *The Planetary Report* he'd get with his Planetary Society membership, something I now have started doing again due to my getting a membership of my own. It helped foster my desire to know more about what was out there. When I was in third grade, the librarian at school said I couldn't check out *Exploring Your Solar System* anymore, since I had checked it out for six months straight and other students should get a chance to read it(It sat there on the shelf for years afterwards, until it was finally put on the discard rack and I acquired it and kept it until it fell apart from use).

From Boy Scout camping trips to my current adventures observing the heavens, I have noticed that I tend to gravitate toward outreach and social interaction. I set up my scope(s) and camera equipment, and proceed to talk the night away with whoever passes by. Whether I'm in the park here at home, letting kids and parents there for baseball practice look at the moon or up at Big Stump or Eastman lake, I find myself looking less and talking more.

Back in those younger days, I would tell the other kids in my class about space and all the things my little book said were out there, and then assure them the Sun dying in five billion years wasn't something they had to worry about. To this day, I still find myself gravitating toward the outreach and sharing of information. I don't know why it gives me joy, but it does, and it seems to be my calling in the astronomical field. Though today, the conversations may veer into current events or politics, I enjoy just being around people who are interested in the things that interest me. I look forward to many more nights conversing with good, well rounded people who can appreciate the night sky. Dark places just seem to attract those persons of my interest.

Number of exoplanets found as of August 2021- 4,801

How many more are out there?

Tens of thousands? Hundreds of thousands?

Maybe millions?

CVA Board Meets to Hash out 2022 plans and Covid Responses

By Scott Davis

On August 21, the CVA board met via Zoom work out the 2022 calendar, discuss future activities, and formulate responses to the ongoing Covid Delta surge. Present were CVA president Ryan Ledak, vice-president Scott Davis, secretary-treasurer Steve Harness, board members Warren Maguire and Fred Lusk, and Observer editor and historian Larry Parmeter. The meeting started at 2pm.

Using the moon phases calendar for 2022, members of the board selected dates for the club's star parties, meetings, and sidewalk observing events for 2022. (The 2022 calendar is on the next page).

Concerning Covid-19, a number of decisions were made regarding club events that are affected by the continuing spread of the virus: 1) Dark-Sky Star Parties (Eastman Lake & Courtright) will be considered members-only until at least the end of 2021. The Star-B-Que on October 2, 2021, is cancelled, but that night's star party will run as scheduled. 2) The club will continue the policy of not accepting private star party requests until at least the end of 2021. 3) All River Park Sidewalk Astronomy dates through the end of 2021 are cancelled. 4) Club Meetings for the remainder of 2021 will continue to be conducted through Zoom for members and broadcast over Facebook for non-member guests. 5) Due to the continued uncertainty surrounding Covid-19, the Young Astronomers Program will not be offered for the 2022 program year. 6)The policy for events mentioned above will be revisited during the business portion of the December 21, 2021, club meeting.

The idea was introduced for the club to potentially have an indoor booth at the Fresno Home and Garden Show in the Spring of 2023. The idea would be to have a couple of telescopes where people could ask questions about the club and perhaps request education and/or star party events. It was brought up that the biggest challenges would be getting gear into the booth and making sure there were ample volunteers for the three-day event. There was definite interest from the members of the board; this topic will be discussed in early 2022 to develop more specifics.

Dark Sky Festival 2022. The Dark Sky Festival takes place in the late summer in Sequoia/Kings Canyon National Park and is run by the Sequoia Parks Conservancy. The 2021 Dark Sky Festival has already been cancelled due to Covid-19, but discussion was on whether our club would be interested in participating again in 2022. There was definite interest from the members of the board; this topic will be discussed in 2022 when more event information is available.

As has happened a couple of times in the past, the Downing Planetarium staff offered to let the club use its facilities for a club meeting, to be followed by a planetarium show. This show would be offered in accordance with whatever Covid-19 restrictions were in place at the time. While there was definite interest from the members of the board, the decision was made to decline due to the continued virus spread. The board will revisit this idea once the Covid situation has improved to a point where the risk is minimal or eliminated.

A request was made to list the scheduled presenters for the remaining four club meetings in 2021. They are:

September 18 – Steve Harness
October 23 – Scott Davis
November 20 – Ryan Ledak
December 18 – John Baptista

Larry Parmeter offered to be a backup should any of the above be unavailable to give their talk.

Meeting Adjourned by Ryan Ledak at 3:15pm.

CVA Calendar for 2022

Regular Star Parties-Primary location- Eastman Lake
Begin at Dusk
January 1
January 29
February 26
March 5
April 2
April 30
May 21
May 28
June 25
July 30
August 27
September 24
October 10(Star-b-que)
November 19
November 26
December 17

Star Parties at Courtright Reservoir
June 24-26
July 29-31
August 26-28

Public-centered Star Parties-For 2022, the public-centered star party dates are dependent on the Covid virus situation

River Park Shopping Center-movie theater plaza
Time– 6pm-10pm
March 12
April 9
May 7
June 4
July 9
August 6
September 3
October 1
October 29

Millerton Lake
Millerton Lake State Park boat ramp west side
Time 6pm-10pm
June 18
July 23
August 10

CVA Club Monthly meetings
Location CSU Fresno room EE191-dependent on the Covid virus situation
Time 7pm-9pm
January 15
February 12
March 19
April 16
May 14
June 11
No July meeting
August 13(annual board meeting)
September 10
October 8
November 5
December 3

Profiles in Science

Two Renowned Scientists Pass Away

Steven Weinberg 1933-2021

Steven Weinberg, Nobel Prize winner, one of the best-known physicists of the 20th century, and a leader in explaining the composition of the universe, died on July 23, 2021, at age 88. No reason was given for his death, but it was believed to be from natural causes.

Weinberg was born and raised in New York City and attended the prestigious Bronx High School of Science, a breeding ground for future Nobelists. One of his classmates was Sheldon Glashow, who would eventually share the Nobel Prize with him. Afterwards, he attended Cornell, and then spent a year at the Neils Bohr Institute in Copenhagen, Denmark. Returning to the U.S., he earned a doctorate in physics at Princeton, then did post-doctorate work at both Columbia and U.C. Berkeley; he eventually took a professorial position at Berkeley. In 1966, he moved to Harvard, where he renewed his friendship with and collaborated with his old high school classmate Glashow. In 1982, though, he was offered a position at the University of Texas at Austin and stayed there for the rest of his life. People who knew him say he never retired and was teaching and working on physics problems almost up to the time of his death.

Weinberg is best known for what is called the electro-weak unification. In a paper in 1967, he successfully unified two of the four fundamental forces of nature, electromagnetism and the weak force. His analysis called for the finding of two new particles, the W and Z particles, which would prove the unification. During the time that Weinberg was working on his theory, the early 1960s, Glashow was also working on electro-weak unification and came to the same conclusion. A third scientist, Abdus Salam, a Pakistani-born physicist at Oxford University, as well discovered electroweak unification at about the same time. After the W and Z particles, indicators of the electro-weak process, were discovered at the supercollider at CERN in Geneva, Switzerland, all three were awarded the Nobel Physics Prize in 1979.

In addition to his teaching and research, Weinberg became a leading spokesperson for public understanding of science, and often testified before Congressional committees on science and its impact on politics and everyday life. He also wrote a number of popular books on science in general and physics in particular. At his death, he was compared to physics luminaries such as Albert Einstein, Richard Feynman, and Murry Gell-Mann. Besides the Nobel Prize, he won many other awards and was a member of a number of organizations, including Britain's prestigious Royal Society and the American Academy of Arts and Sciences.

Carolyn Shoemaker 1929-2021

Carolyn Shoemaker, who became the world record holder for finding the most comets and asteroids, and with her husband Gene and David Levy, discovered the most famous comet of the 20th century, Shoemaker-Levy-9, died on August 13, 2021 at the age of 92.

Carolyn never originally planned to go into astronomy and space sciences. Born in Gallop, New Mexico and raised in Chico, California, she intended to be a schoolteacher. She ended up attending Chico State College(as it was then called), majoring in English and History. In the meantime, her brother Richard attended Caltech, where his roommate was a geology major named Gene Shoemaker. Carolyn

and Gene ended up getting together as a result and married in 1951. She then taught middle school for a few years before raising a family, while Gene almost single-handedly developed the field of planetary geology and trained NASA astronauts to work on the moon(Gene wanted to be an astronaut and go to the moon himself, but medical issues prevented him from doing it. Instead, his close friend and fellow geologist at the U.S. Geological Survey, Harrison "Jack" Schmitt, walked on the moon as a member of Apollo 17 in 1972). All the time, Carolyn helped Gene with his research at the Geological Survey and nurtured a growing interest in comets.

In the late 1970s, at age 50, with their three children out of the house, she became a full time comet hunter. While Gene became an authority on meteor impact craters, Carolyn became the finder of more comets and asteroids than anyone else in history. Her best-known discovery came in 1993, when she, Gene and then amateur comet finder David Levy found a comet that had broken up in a number of pieces and was heading straight for the planet Jupiter. Between July 16 and 24, 1994, the fragments crashed into Jupiter's atmosphere, the first time scientists were able to watch and study an impact event in the solar system. It made Levy and the Shoemakers, especially Carolyn, world famous.

In 1997, while in Australia to study meteor impact craters, Gene was killed in an auto accident and Carolyn was seriously injured. After recovering, she continued her searches through the Lowell Observatory, eventually discovering 34 comets and over 500 asteroids and minor planets.

Carolyn won many awards for her work, including honorary doctorates, the NASA Science Metal, and the Medal of the National Academy of Sciences. The asteroid 4446 Carolyn is named in her honor.

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

The Skinakas Observatory

The Skinakas Observatory is located on Mt. Psiloritis, at 5,700 feet, on the island of Crete in the Mediterranean Sea. It is jointly run by the University of Crete, the Hellas Foundation for Science and Technology, and the Max Planck Institute for Astronomy.

The observatory was first proposed in 1984 and initial facilities were quickly built in order to study Halley's Comet in 1986. The first telescope was a .3m reflector, which confirmed the clear skies and good viewing conditions. In 1994, a 1.3m Ritchey-Chretien reflector was installed, and kt has been the main telescope ever since. In 2006, a third telescope, a .6m Cessegrain, when into operation. This is a completely automated telescope and is operated remotely. Professors and students from the physics department of the University of Crete are the primary users of the telescopes. Their main focus is on galaxies, binary stars, and planetary nebulas. Although the observatory is primarily for academic research, it has a outreach program where certain nights are set aside in the summer for the public to come and view objects through the telescopes.

Right-the Skinakas Observatory-the 1.3m telescope dome on the left; the .6m dome on the right

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From the Observer Archives

"Intelligence is a luxury, sometimes useless, sometimes fatal. It is a torch or a firebrand according to the use that one makes of it."

From the October 1989 *Observer*
Wise words in any age

What's New in Space

Lots of Questions in this Column

Branson and Bezos Go Up in their own Spacecraft

In what was seen as "the battle of the billionaires," rival spacecraft owners Richard Branson and Jeff Bezos both made spaceflights in July 2021, setting up competing spaceflight companies. Earlier this year, Bezos announced that he would fly aboard Blue Origin's New Shepard capsule on its first crewed flight on July 20, and that one of the four seats would be auctioned off. In late June, he said that his younger brother Mark would be the second passenger, and on July 1, announced that Wally Funk, age 82, would be the third participant. Funk, a veteran pilot and flight instructor, was the youngest of 13 women who underwent astronaut training in the early 1960s, but never flew in space due to restrictions on females at the time. On July 10, Bezos announced that the person who originally won the seat auction could not make it due to a conflict, and that and an alternate, 18-year-old Oliver Dameon of The Netherlands, whose father paid for his bid, would be the fourth person.

Right-Dameon, Funk, Jeff Bezos, Mark Bezos.

In the meantime, Richard Branson, who had originally planned to go on a test flight in the Fall, announced in May that he would be a passenger on Virgin Galactic's next sub-orbital test flight, scheduled for July 9, and that three other Virgin Galactic employees: Beth Moses(who had previously flown in space), Colin Bennett, and Sirisha Bandla, would be aboard as well as pilots David McKay and Mike Maccuci(both of whom also had already flown in space).

Below-Bennett, Moses, Bandla, Branson

Both flights were publicity extravaganzas and both, fortunately, went off as planned. On July 9, Branson and his passengers, as well as the two pilots, flew to 54 miles above the New Mexico desert before landing safely near White Sands. On July 20, Bezos and his crew were launched by the New Shepard system to 65 miles above West Texas, landing safely as well 15 minutes after take-off. Funk became the oldest person ever in space, while Dameon became the youngest. Bezos claimed that he made a "true spaceflight," by going above the Karmen Line, 100 kilometers, or 62 miles, as specified by the International Aviation Federation. But Branson also claimed that he passed the 50 mile mark required by NASA and the Federal Aviation Administration for spaceflight. Both came back to face criticism: Branson for taking a joyride while sitting on his billions, and Bezos for thanking Amazon for making his flight possible(Amazon has recently been under fire for alleged low pay and long hours for its employees. Also, before the flight, over 75,000 people signed an online petition demanding that once Bezos went into space, he should be required to stay there. Only a week before the flight, Bezos resigned as Amazon CEO, but is still its largest stockholder). But both are going ahead with their plans for commercial tourist spaceflight-see next article.

Space Tourism Takes Off-Or Does It?

In the wake of the two space missions(although the FAA may not call them that), both Richard Branson and Jeff Bezos say that they are open for business within the next year. Branson says that Virgin Galactic will make two more flights above 50 miles this year as final tests for the Virgin Galactic system, then begin regular operational sub-orbital flights carrying paying commercial passengers early in 2022. He estimates that eventually the company will make over 300 flights a year, although indications are that it will more in the line of 50-60, about one a week. Virgin Galactic currently has over 600 people, some of whom signed up in 2004 when the program was first announced, who have put down deposits for the estimated $250,000 fee to go into space(For newcomers, it's now $450,000). After the New Shepard flight, Bezos claimed that hundreds of people want to sign up for Blue Origin. Whether all of them will go through with it, also considering that the FAA will not give "astronaut" recognition to people simply for taking a joyride into space, remains to be seen. But the first steps have been taken and the opportunity is there.

Bezos Offers to Subsidize NASA's Artemis Lunar Lander-As Long as it's *His* Lander-And then Sues NASA

Only a few days after his New Shepard flight, Jeff Bezos, in a letter to NASA chief Administrator Bill Nelson, offered NASA up to $2 billion in remittances to develop Blue Origin's Blue Moon lunar lander for the Artemis moon landing program. Bezos told the space agency that Blue Moon could be ready for test flights by the spring of 2024, using the New Glenn heavy lift booster rocket. So far, NASA has not responded to Bezos's offer, but Nelson is known to want at least two companies to build lunar landers. Experts say there are two reasons why Bezos suddenly decided to put up his own money to develop a lunar lander. He's irked that NASA chose rival Space-X's Starship to make the initial moon landings ahead of Blue Origin and a third aerospace company, Dynetics. Both companies protested the decision; on July 30, the Government Accountability Office ruled that NASA was within its rights to award the lunar lander contract to only one company. On August 16, Bezos and Blue Origin upped the dispute by filing a civil lawsuit in Federal court, alleging that the selection process was unfair and the Space-X Starship was inherently dangerous. Also, Bezos has come under increasing fire in the last few months in the wake of revelations that he pays very little tax on his personal fortune, which is now estimated at $200 billion. On top of that, the U.S. Senate voted to give up to $10 billion to Blue Origin to develop a lunar lander(the bill, though, died in the House). Many members of Congress openly questioned why the world's richest person should be given money by the government. In short, Bezos is making a big stink to divert his increasing number of critics.

Russia Planning to Pull Out of ISS? Or is It?

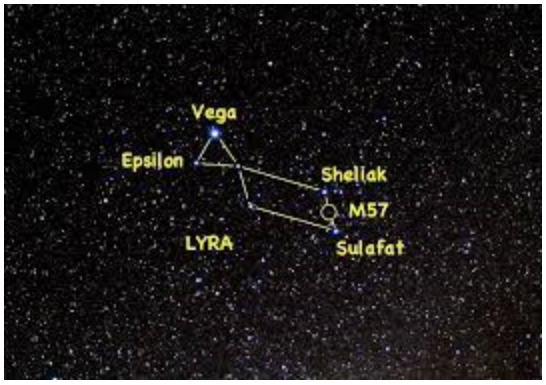
Despite the fact that RKA announced it is leaving the ISS program after 2024, it still launched the Nauka("science") module to the space station on July 22. Nauka, which docked with ISS on July 29, taking the place of the Piers module, was originally scheduled to be launched in 2007 and has been repeatedly delayed by technical problems and financial shortages, is a state-of-the-art science laboratory that is larger and more spacious than Zvezda, the main Russian module. Project managers now say that Nauka will stay permanently attached to ISS and will be operational for ten years, which begs the question, why was it

launched in the first place if the Russians are planning to pull out in a couple of years? Many space experts believe that RKA has no realistic intention of leaving ISS anytime soon and that that the pull-out announcement is mainly designed to increase bargaining leverage with NASA over future ISS budgets. Since NASA does not have to buy Soyuz seats anymore, RKA's revenue has decreased by as much as 20% and Russian space officials are scrambling for ways to make it up. RKA knows that NASA needs it to remain part of the ISS program and the threat of leaving may persuade it to chip in more to keep the space station going with all members.*

***As of the 2019 budget(the most recent for which I was able to find numbers)-the U.S. paid 56% of ISS's operating costs, Russia 23%, ESA 10%, Japan 9%, and Canada 2%.**

Star Stories

Shelaik



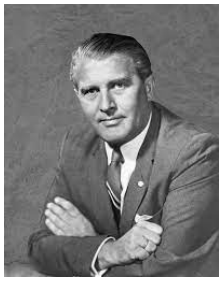
Sheliak, officially designated Beta Lyre, is the second brightest star in the constellation Lyra, after Vega. It is actually a multiple star system, made of at least eight stars with a collective apparent magnitude of 3. 5 and an absolute magnitude of -3.82. It is estimated to be about 960 light years from our Sun.

The main "star" in Shelaik is Beta Lyrae A, which is a triplet system, made up of a binary pair known as Beta Lyrae Aa, whose two stars are in turn known as Aa1 and Aa2. They are both B stars, Aa2 of which has an accretion disc around it, possibly a protoplanetary system. Because Aa1 and Aa2 are an eclipsing binary pair and amount to about 80% of the luminosity of the system, Beta Lyrae shows a variability in its magnitude from 3.2 to 4.4 over a period of about thirteen days. The third star in the triplet is a single star designated Beta Lyrae Ab. It is also a B star. The other stars are all single stars and are known as Beta Lyrae B, C, D, E, and F. C, which is very faint at mag 13.2, is a B2 star, and D is a K3 star at mag 14.9. E and F are G5 stars at mag 9.7 and 10.1 respectively. Some scientists believe that C, D, and E are not close to the others at all, but are simply in the line of sight of Beta Lyrae.

The name *Sheliak* comes from Arabic and refers to one of the traditional names for the constellation Lyra in Arabic astronomy. In the Chinese astronomical tradition Sheliak was known as *Tsan Tae*, relating to Clepsydra Terrace, a timekeeping mechanism powered by water in the celestial mansions. Tsan Tae was one of four stars in that made up the asterism we known as the paralleleogram in Lyra.

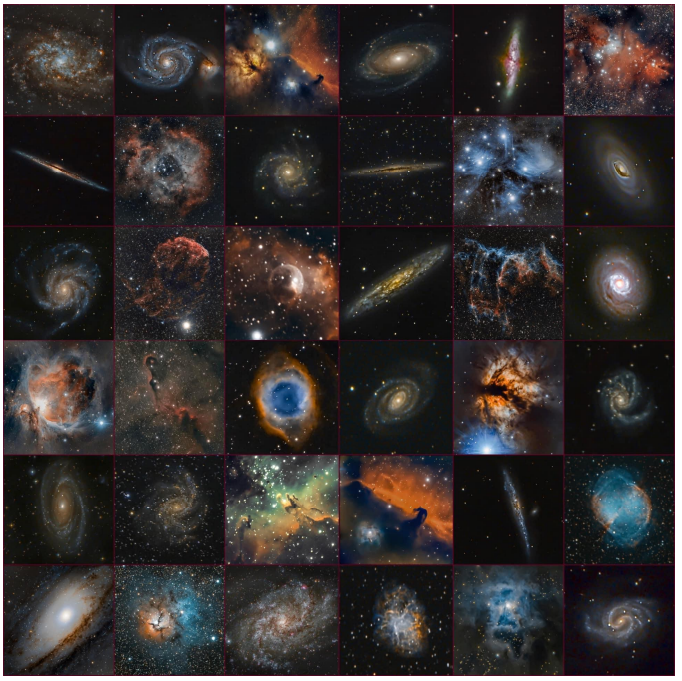
Left-Sheliak, showing six of the eight stars, including the bright triplet Beta Lyrae A in the center

There's just one thing I can promise you about the outer space program — your tax dollar will go further." — *Wernher von Braun*



CVA Member Contributions

A beautiful image of the Milky Way by Karlton Cruz



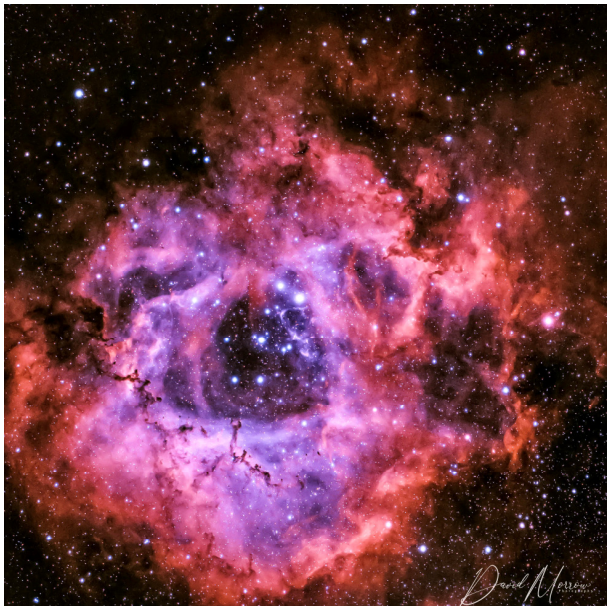
A composite image of several galaxies and nebulas by William Morgan

Below-William Morgan's telescopes for his astroimaging

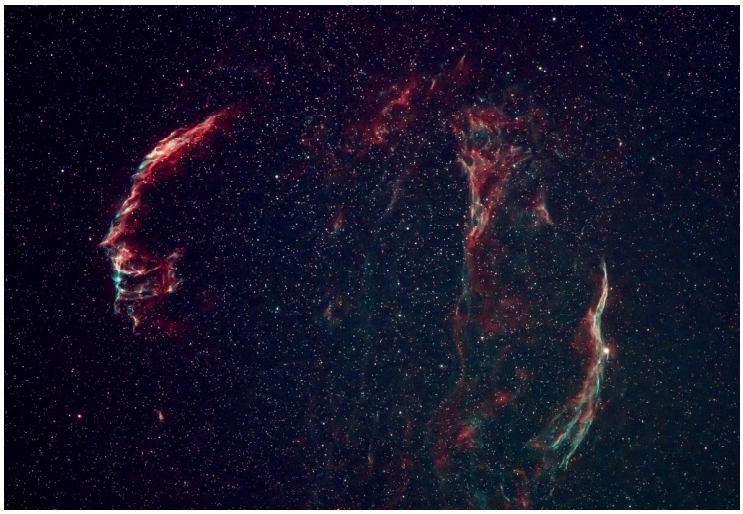
More CVA Member Contributions

Three wonderful images by David Morrow

The Andromeda Galaxy



The Rosette Nebula



The Cygnus Loop

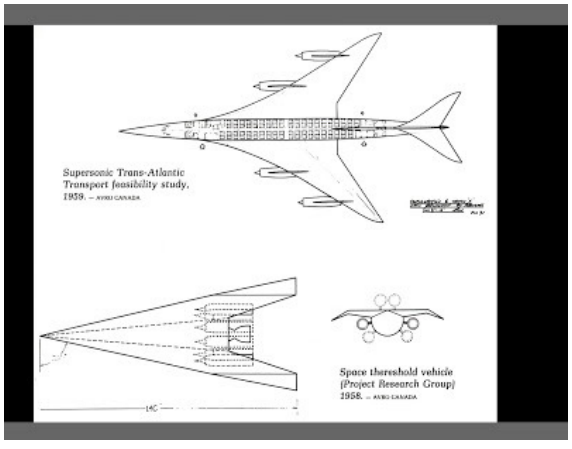
Right-David's astroimaging telescope

The United States, NASA, and the Canadian Connection-Part 2

When John Frost came to Avro-Canada, it was transitioning from the propeller-plane era and taking the first steps into the jet era. Shortly before his arrival, the company brought out Canada's first jet fighter, the CF-100 in 1947. It was an extremely successful aircraft, eventually playing a central role for NORAD and NATO forces during the 1950s and 60s. As late as 1981, the CF-100 was still being used by the Canadian Air Force as a training and ground support craft. Almost 700 were built and used by the air forces of several nations. An advanced supersonic version, called the CF-103, was proposed and designed, but never got beyond the mockup stage before it was cancelled.

Avro-Canada also had its eye on the post-war commercial passenger airline market. In 1949, it introduced the C-102, a four-engine passenger jetliner that could serve regional markets. However, the Korean War intervened a year later, and only two C-102s were built as the production line was shifted to CF-100s to serve in Korea.

By the early 1950s, the Canadian Air Force saw the need for a supersonic fighter jet incorporating swept wings and advanced avionics equipment. A number of different design concepts were advanced, and by 1954, a delta-winged craft with two engines was proposed. This was the CF-104, which was never built, but led into Avro's crowning achievement of the late 1950s-the CF-105, known as the Arrow. Frost's Special Projects Group was also said to have had played major role in the Arrow, along with its VTOL craft. The CF-105, which was introduced in 1957, was everything that an advanced jet fighter was supposed to be: it had delta wings, two powerful engines, and the newest avionics systems. It could fly at or above mach two and carry a number of different weapons systems. Many aviation experts called it the most advanced jet in the world, far superior to anything to anything, including what the United States had, in the air at that time. When it was introduced, advanced models of it, including a version that could fly as fast as mach five, were being designed. It had only one flaw: it was horribly expensive. A large populated country like the United States could probably absorb the cost of the aircraft, but Canada could not without large orders from other countries, and when those failed to materialize, the Canadian government cancelled the program in February 1959. It was one of the darkest days in modern Canadian history; over 15,000 workers lost their jobs(even though at the time Avro executives claimed they were caught completely by surprise by the government's decision, it's now known that they were aware for several months that the Arrow would probably be cancelled). Five prototypes had been built, and the government ordered all of them to be destroyed. Stories have circulated for years that on the night of the cancellation one of the prototypes was secretly flown to England and was seen at RAF bases off and on for several years afterwards.



At the same time that the Arrow was being designed and developed and the Y2 and Silverbug projects were underway, Frost's Special Projects Group was heavily involved in the newly emerging space era. In 1958, the SPG designed what was called the Space Threshold Vehicle. This was a swept-semi-delta winged vehicle the size of a small bomber, powered by four hybrid jet-rocket engines, which could fly

as high as 200,000 feet at speeds of close to mach nine. It could be refueled in flight and could carry payloads that would be dropped and then rocketed into space. Although it never got beyond the concept stage, it showed the future of a spacecraft that could take off like an airplane and go into space-an almost single-stage-to-orbit vehicle. Also, in 1958, when the newly formed National Aeronautics and Space Administration asked several major companies for proposals for space vehicles for what would become Project Mercury, the Special Projects Group submitted a design for a spherical shaped capsule that was similar to the early Soviet Vostok spacecraft. It was Avro's expertise in cutting-edge spacecraft which would eventually catch the eye of NASA.

When the Arrow was cancelled, NASA did not hesitate; the day after the program was ended, Robert Gilruth, the director of NASA's Manned Space Task Force, was in Toronto with several assistants interviewing Avro engineers(according to some stories, Gilruth called James Chamberlin, the chief designer of the Arrow, only a few hours after the cancellation announcement and asked him to come to work for NASA. Chamberlin accepted and recommended several of his colleagues. Gilruth already knew many of the Avro engineers; because of limited facilities in Canada, some of the Arrow testing was done at NACA/NASA sites in the United States). An initial group of 35 was hired within a few months, and over the next twenty years, they and others hired later would have a major influence on the U.S. space program, and in particular, the Apollo moon landing program. Chamberlin, after working on Project Mercury, headed the team that designed the Gemini spacecraft in the fall of 1961 and then worked out the details of the Lunar Orbital Rendezvous method for getting men to the moon. Owen Maynard, who was one of Chamberlain's assistants on the Arrow project, was responsible for the design of the Lunar Module. John Hodges, a British-born engineer, played a leading role in the planning of the Apollo moon missions and was one of the three flight directors during the moon landings. Some of the former Avro engineers worked with Werhner Von Brauns's Saturn 5 team; others were involved in the design and construction of the Lunar Receiving Laboratory and the astronaut quarantine trailer. One of the former Avro employees, Bill Carpentier, a flight surgeon, volunteered to spend time in the quarantine trailer with the Apollo 11 astronauts after they returned to Earth. By the late-1960s, still another group of Avro engineers, some of whom had been with Frost's SPG, were put to work on a successor to the Apollo program, a space vehicle that could be launched like a rocket, carry cargo and passengers into space, and then land like an airplane. The Avro group designed early conceptual versions of what would become the space shuttle. After the end of the Apollo program, some of the Avro engineers left NASA, but others stayed and worked with the space shuttle program into the 1980s, and a few worked on the international space station in the 1990s before retiring. As one Canadian aviation writer said many years later, "America's moon landing program would have been very different (without the Avro engineers)." Another wrote of a popular Canadian saying, "The cancellation of the Arrow was the best thing that happened to America."

Chamberlin left NASA in 1970 and went to work for McDonald-Douglass; Maynard stayed with the space agency into the mid-1970s and then worked for Raytheon for many years. Others also went into private industry in the United States or eventually returned to Canada. Very few people outside of NASA knew about their presence and accomplishments. Most are gone now, but before their deaths, Canadian historians interviewed many of them for their oral histories, and since 2010 several magazine articles have appeared spotlighting them and what they achieved.

The cancellation of the Arrow essentially marked the beginning of the end for Avro. Even though the company had various other profitable programs, including hovercraft and jet engines, it was not enough to make up for the tremendous costs of the major aircraft projects. In 1962, the Canadian government shut down Avro-Canada for good, almost 50,000 people lost their jobs, and the era went into the history books. Still, what it and its engineering brains achieved is felt to this day, a largely untold story that paved the way for America to get to the moon and lead the space era after it.