

ORBIT

Astro Space Stamp Society

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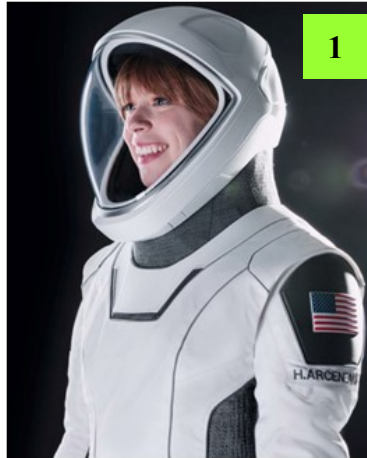
A new series by Nik Steggall



Hayley Arceneaux, the hope on Inspirati④n

Following on from our last issue about Tourists in Space, Umberto Cavallaro take a look at Hayley Arceneaux, who was on the Inspiration 4 flight.

Hayley Arceneaux is an American civilian, who, a few months ago, suddenly became a private astronaut when she was chosen as a crew member of the history-making mission “Inspirati④n”, the world’s first all-civilian space flight in the Earth orbit, in which no one on board was a professional astronaut (See footnote 1). During this mission, arranged and commanded by billionaire Jared Isaacman (See footnote 2), Hayley established many records in one go, as the youngest American ever in space, the first cancer survivor astronaut, and the first person to launch in space with a prosthesis, as most of her femur was removed and replaced with an artificial joint when she was 10 years old.

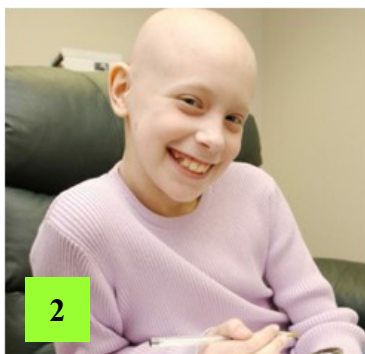


Hayley was born on December 4th, 1991 in St. Francisville, outside of Baton Rouge, Louisiana. She was a little girl when, at 9, with her brother Hayden, 7, travelled to Houston and visited NASA on a family vacation. “I got to see where the astronauts trained – she recalls –and of course I wanted to be an astronaut after that – who doesn’t?”

But any thoughts of a career in space got abruptly shelved a few months later. She had just turned 10 when she started complaining about pain in her left leg. At first her doctor thought it was just a sprain, but a few months later, tests revealed she suffered from osteosarcoma in her left femur just above the knee. “I remember just being so scared because everyone I had known with cancer had died” – she recalls. She spent a year as a patient at St. Jude Children’s Research Hospital undergoing chemotherapy and a then-breakthrough surgery in which most of her femur was removed and replaced with an innovative prosthetic device, that can expand without more surgery as she grows. The

treatment was followed by long sessions of physical therapy.

Despite the immense challenge of cancer, this was for her the most important year of her life, a formative experience. “I think having cancer – she



says – made me what I am. It taught me to kind of expect the unexpected. It made me tough.” She remembers the hospital as a “magical place” for creating an environment that celebrates life and lets kids be kids, despite their struggles. “I really felt like the staff was my family. – she recalls – When the doctor told me that my scans were clear and that I could go home at the end of treatment, I’d cry because I didn’t want to leave. I think that feeling of not wanting to leave has just stayed with me my whole life”. The experience inspired her to want to work with other pediatric cancer patients.

After graduating from St. Joseph's Academy in Baton Rouge, Louisiana and obtaining an undergraduate degree in Spanish in 2014, she obtained her Physician Assistant (PA) degree in 2016 from LSU Health in Shreveport, Louisiana.

While studying in LSU Health school, she applied to work at St. Jude but didn’t get an interview. She was told she needed more experience. She specialized therefore in emergency medicine for 3.5 years. Only in April 2020 Hayley found her “dream job” as a St. Jude front line physician assistant, working with children fighting leukemia and lymphoma. But she’s more than a health caregiver “I especially tell the new patients – she says – that I had cancer as well, almost two decades ago. I kind of know what they’re feeling. I know it’s scary, and overwhelming, especially at first.”

On the 5th of January 2020 she was at home in



Tennessee when she received a mysterious email from the Hospital, vaguely presenting her with an extraordinary opportunity that they wanted to discuss with her. At first she thought it might be about a commercial or that they might be asking her to be a participant at a conference somewhere.

When she learned that it was an opportunity to be an astronaut, her first reply was “What? Yes. Yes, please,



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that would be amazing”. Then she added “Let me talk to my mom”.

Her mom did not object. After checking with her brother and sister-in-law who – as aerospace engineers – reassured her how safe space travel is, she agreed to join the crew. But she was asked to keep her lips sealed. "I've held onto the biggest secret of my life for a month and a half" she says.

Finally on February 22nd, 2021 she could announce: “The secret is finally out! Later this year I will be part of the first all-civilian mission to space! I am so grateful for this incredible, once in a life-time opportunity and honor, and I cannot WAIT to show the world what cancer survivors can do”.

She was chosen to represent “Hope”, one of the four pillars on which the Inspiration4 mission was based (See footnote 3). “It’s an incredible honor to join the Inspiration4 crew. This seat represents the hope that St. Jude gave me and continues to give families from around the world who, like me, find hope when they walk through the doors of St. Jude,”

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The mission crew underwent a very intense six-months astronaut training programs with 90 different exercises. They included spending time in spacesuits and getting acquainted with the simulator and the centrifuge, preparing for any in-space emergency that could arise, including experiencing brief moments of low oxygen and high levels of carbon dioxide. They also had training in the altitude chamber, micro gravity environment in zero-gravity flights,

centrifuge training. The program also included water survival training and a hike up for almost 10 hours through the snow of Mount Rainier, Washington state’s highest mountain. This experience served as crew bonding and "getting comfortable being uncomfortable", as commander Isaacman says.

“When I was climbing Mt. Rainier – Hayley recalls – I thought about how I could share the experience with [the kids]. Climbing a mountain is a lot like battling cancer. You have to keep in mind the end goal, but also take one – sometimes hard, painful, difficult – step at a time to reach your destination”.

“In addition to learning all that I have learnt about space, rockets and astronauts, I have also learnt a lot



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about myself. This experience has made me realise that I am stronger than I thought I was”.

Hayley was launched, on September 15th, 2021, from the Kennedy Space Center – the same launch pad used by the Apollo moon missions and NASA's space shuttle program. She was on board the same SpaceX's Dragon Resilience Spacecraft which was already used by Crew-1 mission launched in November 2020. The company say each Crew Dragon is rated for at least five missions. Also the refurbished Falcon 9 rocket was previously launched twice, carrying into space two different GPS satellites for the U.S. Space Force.

Unlike SpaceX’s crew missions under contract to NASA,



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equipment, including a portable ultrasound for medical tests. While Isaacman, Proctor and Sembroski faced the camera in an upright position, Hayley floated upside down in the zero-gravity environment. The questions showed the children's fascination with life in space: What kind of sleeping bags do they use? Are there cows on the moon? What is your favorite space food? Are there such things as aliens in space?

As SpaceX CEO Elon Musk mentioned in a tweet on September 21, the Inspiration4 crew had "some challenges" with the toilet, which was located at the nose of the Crew Dragon spacecraft inside the glass dome roof. SpaceX team had to instruct the Inspiration4 crew on how to fix the problem, but frequent communications blackouts interrupted the process.

the Inspiration4 flight did not travel to the space station, but reached an unusually higher-than-normal trajectory at an altitude of approximately 585 km (364 mi), higher than astronauts have flown since the last space shuttle maintenance mission to the Hubble Space Telescope in 2009, surpassing the International Space Station by 160 km (100 mi). The passengers enjoyed spectacular views of planet Earth through a big bubble-shaped cupola window fitted to the front top of the Crew Dragon capsule, replacing the docking adapter used for missions to the International Space Station.

Astronauts could bring some personal items. Hayley

The mission orbited at this altitude for two days and then lowered its altitude to about 365 km (227 mi) which it kept during the final day of the mission, in preparation for the re-entry.



On the second night of the flight Hayley chatted with her young patients when the crew video-called St. Jude Children's Research Hospital to share with several children their experience aboard SpaceX's Resilience capsule. While passing over Europe, they held a 10 minute video chat, showing some of their high-tech

brought into space a garish St. Jude tie that her father used to wear, grateful for the medical care that saved Hayley's life when she was an osteosarcoma patient in 2002 at St. Jude. She also brought with her the book "Goodnight Moon" that she plans to keep for the children she will have one day, and a plush toy dog that served as a zero-gravity indicator shortly after liftoff.



During the mission data were collected on the effects of space travel on ordinary civilian citizens who were truly inexperienced beginners in space travel and who had not been chosen following the usual criteria used to select astronauts. In addition, they were not exhaustively trained, like professional astronauts are.

Images



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The all-civilian Inspiration4 crew returned to earth about 7:07 pm EST on September 18, 2021

THE CREW WRAPPED UP THE FIRST ALL-CIVILIAN PRIVATELY-FUNDED TRIP TO ORBIT. UNDER FOUR LARGE PARACHUTES THEY PLUNGED BACK TO EARTH FOR AN EARLY EVENING SPLASHDOWN IN THE ATLANTIC OCEAN AFTER THREE DAYS IN SPACE. THIS SpaceX INSPIRATION4 MISSION SHOWED THE WORLD THAT SPACE IS FOR ALL.



1. Hayley Arceneaux
2. Hayley during the treatment at St. Jude
3. The four crew members Hayley Arceneaux, Jared Isaacman, Dr. Sian Proctor and Chris Sembroski
4. The official Inspiration4 beer by Samuel Adams
5. Cover commemorating the official presentation of the Inspiration4 mission (Gus Kathman)
6. Mission Patch
7. Cover commemorating the rehearsal of the mission launch (Gus Kathman)
8. Cover by Dave Silcox commemorating Inspiration4 launch
9. Cover by Gus Kathman commemorating Inspiration4 launch
10. Commemorative launch cover (by Dave Silcox)
11. Commemorative return cover (by Dave Silcox)

The study was done in collaboration with SpaceX, the Translational Research Institute for Space Health (TRISH) at Baylor College of Medicine in Texas, and the Weill Cornell Medical College in New York City. The crew were tested: the tests included ultrasounds experiments, collection of microbe samples and a variety of in-flight health experiments: measuring and monitoring of cardiac rhythms, sleep and blood oxygen levels, heart rates and effect of radiation exposure. Their cognitive functions were tested before the flight and examined again after their return.

After three days in space, Inspiration4 returned to Earth on 18 September 2021, at 7:06 p.m., just before sunset, slowed down by four large parachutes, the capsule gently splashed down into the Atlantic Ocean off the coast of Cape Canaveral, Florida, not far from where the flight had begun three days earlier. Within a few minutes of splashdown, a SpaceX boat arrived to recover the capsule. When the hatch was opened on the deck of the recovery ship, Hayley was the first one out, showing an ecstatic smile in her face.

Hayley has always been adventurous and describes travel as her favorite hobby. She has studied in Spain, worked mission trips in Nicaragua and Peru, and visited 21 countries in 5 continents. She had hoped this would be the year that she would complete her aim of visiting all seven continents before she turned 30. She didn't have the time to do that, but now she can add "space" to her passport. As she didn't get a passport stamp for going into space, she told she would draw a star and the moon in one of her passports.

(Footnote 1) The entire crew of the history-making Inspiration4 mission consisted of private citizens: besides Hayley Arceneaux serving as the medical officer, Commander Jared Isaacman, 38, pilot Dr. Sian Proctor, 51, and mission specialist Chris Sembroski, 42 were all part of the mission. This was the fourth crew to ride in a Dragon capsule, the SpaceX vehicle built as an astronaut taxi service to ferry humans to and from the International Space Station (ISS) and other destinations in space. The vehicle is designed to be fully autonomous and it is controlled by SpaceX on the ground, although the crew is trained on how to "fly" the Dragon in case of an anomaly. For the first time, with this mission, three different Dragon space craft were in orbit at the same time. (The

other two, Crew Dragon Endeavour and the cargo Dragon CRS-23, were docked with the ISS).

(Footnote 2) Jared Isaacman, the 38-year-old founder and CEO of the payments processing company *Shift4 Payments* (that sells credit-card-processing terminals and point-of-sale systems to restaurants and other businesses) is an experienced commercial and military jet pilot who, in 2008 and 2009, flew Speed-Around-The-World flights to raise money and awareness for the Make-A-Wish Foundation. This time he purchased the flight from SpaceX to benefit St. Jude Children's Research Hospital, in Memphis, Tennessee, an institution that performs cancer research and develops cures for childhood cancers and other diseases, offering medical services and treatment to children at no charge. Inspiration4 mission had a focus on charity, as it was the largest fund raising effort in the history of St. Jude Children's Research Hospital. The campaign launched by Isaacman himself who charted the spaceflight for an undisclosed sum, and donated the pediatric care center the first \$100 million, aimed at a \$200 million fund raising. After a \$50 million donation from SpaceX founder Elon Musk, the total has exceeded the fund raising goal and it was \$237 million at the end of September 2021. The mission also includes a variety of items to be auctioned off to raise money for St. Jude. Among the things were some Inspiration4 mission jackets featuring unique artwork by St. Jude, a ukulele from Martin Guitar that Sembroski played in space, and sixty-six pounds of hops used upon return by the brewers of Samuel Adams to brew an out-of-this-world beer, the "official beer of Inspiration4".

(Footnote 3) The mission was conceived as a charity mission to send a humanitarian message of possibility and inspire support for St. Jude. Each passenger represented a different virtue: "Leadership" (Commander Jared Isaacman), "Hope" (Hayley Arceneaux), "Generosity" (Chris Sembroski) and "Prosperity" (educator, scientist, pilot and artist Sian Proctor) that are the qualities that helped St. Jude Children's Research Hospital lead the world in the research and treatment of some of the most devastating diseases. "We chose this name Inspiration4 because the principal mission objective is to inspire – Isaacman said in a Netflix documentary about the mission – *The number 4 is symbolic for several reasons. There will be 4 crew members on the spacecraft. And it will be the 4th manned mission from the US since the Space Shuttle was retired almost a decade ago*".