

# The sky is no limit for sibling astronomers

27 April 2014

In 1961, after NASA shot Alan Shepard into space, a 9-year-old boy named Steve Hawley asked his mother to buy him a dime-store telescope.

Several years and several telescopes later, he asked his mother and father to help pay for college. To study astronomy.

Some parents might ask how staring at stars would get him a job. But Bernie and Jeanne Hawley said yes.

Steve Hawley became the astronomer and astronaut who used the [robot arm](#) of the [space shuttle Discovery](#) in 1990 to lift the Hubble Space Telescope out of the cargo bay while flying in orbit at 17,398 mph.

Hubble weighed 11 tons. At 43 feet it was the length of a large school bus. And Steve Hawley, from Salina, Kan., parked it expertly in space, 360 miles above Earth.

The Hubble has made what scientists say are the most astonishing discoveries in human history. It's still up there making more.

Hawley has a unique relationship with the Hubble. He deployed it, repaired it years later in space. Now he is one of the long list of scientists who get to tap on an office keyboard and tell Hubble what to look for.

John Hawley, a [theoretical astrophysicist](#) at the University of Virginia, can list many other historic Hubble discoveries off the top of his head:

- The age of the universe: 13.7 billion years.
- Vivid, compelling evidence that everything in creation started with a Big Bang.
- Compelling evidence that the universe is expanding, and rapidly.
- Evidence that there is "dark energy," a force

driving that accelerated expansion, just as Einstein briefly theorized.

It's the story of us, he said - our home, our universe, how it all started, how vast and beautiful it all is.

"How small we are," John Hawley said. "How vulnerable we are."

And one day, John Hawley said, the Hubble showed one other astounding thing: Scientists pointed it at a section of what looked like black, empty space, and let the camera exposure stay open for a long time.

The photograph this produced, the "Hubble Deep Field," shows thousands of galaxies, glowing faintly in spirals and wisps, tinged with faint white and yellow colors. The universe, scientists extrapolated from that photo, has more than a trillion galaxies, each with trillions of stars.

The size of creation is almost beyond comprehension.

"All these things were theories before," John Hawley said. "Now we know."

John Hawley, a theoretical astrophysicist based at the University of Virginia, is Steve Hawley's younger brother. When they were kids in Salina, Steve would buy a newer and bigger telescope "and pass the hand-me-down telescope to me," John said

One day John Hawley went to Jeanne and Bernie and told them he wanted to study astronomy and physics, and not at the affordable University of Kansas, where Steve went. John wanted to attend Haverford, a private college outside Philadelphia.

The family still didn't have much money. Bernie was a minister; Jeanne taught piano lessons at home.

"I'm sure they had real reservations," he said. "But that brilliant. they didn't bat an eye."

John watched, with his heart in his throat, his brother's first attempted launch in 1984, when Discovery's engine stalled on the launchpad and someone on the radio said "fire." He knew, before the Challenger blew up two years later, how dangerous all this was.

And then six years later he kept tabs from Earth while his brother parked the greatest science experiment in history into orbit.

"I talked with him after," John said. "He said he had the worst headache he'd ever had in his life."

You could argue, John said, that the smartest Hawleys were Bernie and Jeanne, for saying yes to childhood dreams. But John, last year, along with a collaborator, won the Shaw Prize, which Steve says is the Asian version of the Nobel Prize. John split a \$1 million prize with his collaborator.

"People used to ask him if he was related to me," Steve wrote in an email. "Now they ask me if I am related to him!"

The textbook that John wrote about the universe uses color photos shot by the satellite his brother put into space.

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In 1997, astronaut Joe Tanner rode Discovery into space and watched fellow astronaut Steve Hawley grab the Hubble with the robot arm.

Hawley brought it into the cargo bay so they could upgrade components. After that, Hawley redeployed it, and used the robot arm - with Tanner riding it - to do more work on the Hubble during a spacewalk.

Hawley by that time was the most respected astronaut at NASA, Tanner said.

"His nickname was GPC Number 6 because the other five GPCs were the five general purpose computers on the shuttles," Tanner said. "He was

"I looked it up - NASA picked him for the astronaut program when he was only 26," Tanner said. "How does anybody do that? And how does anybody get a Ph.D. by age 26? He'd done that, too."

The biggest reason NASA sent Hawley into space five times was that he was adept at keeping the peace between two astronaut tribes who didn't always get along, Tanner said.

NASA sent two kinds of astronauts up on shuttles, Tanner said: the pilot-engineers, "accustomed to working in teams to run the operations of flight," and the scientists, who had spent years working alone on Ph.D. dissertations on astronomy or medicine or other disciplines.

"Dr. Stevie was both," Tanner said. "He bridged that barrier like no other."

Hawley said he worked hard at that.

"When I went off to a meeting with the operations people, the science people knew that I cared about the science as much as they did," Hawley said.

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Why pay for your son or daughter to go to college to study astronomy? What kind of job can they get with that?

What good is it to spend all that money shooting rockets into space? Why study physics, or black holes, or the theory of relativity? Why not spend money to go to school for practical training that will produce real jobs? For that matter, why spend money or time doing what Hawley does now? For example, earlier this year, when he tapped Hubble on the shoulder again, he asked it to take yet another look at Tololo 26, a weird planetary nebula way out there somewhere, and try to figure out what it is. Tololo 26 was one of his research projects years when he was an astronomy student at KU, long before he shot into space.

Why study Tololo 26, or any form of astronomy?

Hawley says he's heard all those arguments. They everything went well." were sometimes directed at him.

"Not my parents, but others told me that there was not much chance of finding a job in astronomy, but I didn't care," he wrote in an email. "Because it was what I wanted to study. I figured if that plan didn't work out I'd be able to come up with something else.

"That's also the reason I applied to be an astronaut. I didn't really think I'd get the job, but I didn't want to go through my life wondering if I could have done it if I had only tried.

"I have talked with students at KU who are taking a course of study they don't seem to enjoy because a parent or an uncle told them that they needed to get a degree in that discipline that would get them a job. No doubt employment is an important goal, but it's also important to enjoy what you're doing. If you don't, you probably won't be very good at it.

"That's advice I give to young people when I get a chance: Find something you're passionate about."

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Jeanne Hawley never regretted paying for Steve to study the seemingly impractical field of astronomy.

"It never occurred to us to stop him from pursuing his childhood dream," she said.

But she paid for her support with days of sheer terror. Steve Hawley rode rockets into space five times, including three times after the Challenger blew up in 1986.

"I'd been naive before the Challenger," Jeanne said. "I assumed it was all safer than it was."

Steve decided to quit spaceflight after his fourth trip. But NASA drafted him for one more flight in 1999.

Tanner said the rest of that crew did not have as much experience as they wanted, "and I suspect they wanted Dr. Stevie up there to make sure

"I didn't have the courage to tell my mother I was going," Hawley said. "I was a coward. I made my wife tell her."

Jeanne was horrified. When Columbia launched, Jeanne refused to watch, as she had done before. She holed up in a little place in Cocoa Beach, Fla., baby-sitting the children while the rest of her family watched lift-off.

The launch went fine.

But when the television told her the rocket launched, she ran out to the backyard and looked up at Columbia - and got upset.

"I thought from the angle I was looking at, that the shuttle was flying horizontally instead of up," she said. "So I thought something had gone wrong. And I was scared."

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Steve Hawley lives quietly now, in a country that has no [manned space program](#), teaching astronomy in classrooms where some students don't finish class projects on time. And then they email him, asking how to head off a bad grade.

"I warn them," he said. "I tell them that when you know an asteroid is going to impact the Earth, and you have a chance to deflect it, it is best to get on this project early rather than late. But they sometimes do not listen."

He rode rockets to space five times, floated weightless for 32 total days. He and his first wife, Sally Ride, his friend Tanner and the other shuttle astronauts took all those risks and lost 14 friends to space accidents. They followed the daring moon landings of the 1960s and 1970s by making the greatest discoveries in history.

He thinks we've lost some of our daring, including at the moment we decided to pay Vladimir Putin's Russians to take us to space.

Would he go back? He grinned.

"I've had this thought. About 'Space Cowboys.' "

In the 2000 movie by that name, Clint Eastwood and Tommie Lee Jones play cranky old astronauts, called back to fix a malfunctioning space satellite. Hawley is 62 now.

"If they ever needed the old Hubble astronauts to go back up there and bring it home ... I'd go, like 'Space Cowboys,' " he said.

"But the training for those missions ... no way. I never ever want to go through that training again."

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"I never looked out the window much in space," Hawley said. "On those missions you are so booked, there's no time.

"In the sleep periods, there was time to look out the window, but I didn't do it much because I felt guilty. I didn't want anybody thinking I went up there to look out the window.

"But when I did look, I looked at the stars. I am an astronomer. Everybody else looked at the Earth.

"People asked me, 'What did the Earth look like?' I don't know."

He points to a photograph. It hangs on the wall to his left, in his small office at KU.

It's that famous photo that his brother John mentioned: Hubble Deep Field.

All those wisps of galaxies. Trillions of suns, trillions of worlds.

We had little idea those galaxies were out there, Steve Hawley said - "until we went looking."

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APA citation: The sky is no limit for sibling astronomers (2014, April 27) retrieved 29 November 2021 from <https://phys.org/news/2014-04-sky-limit-sibling-astronomers.html>

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