THE OBSERVER

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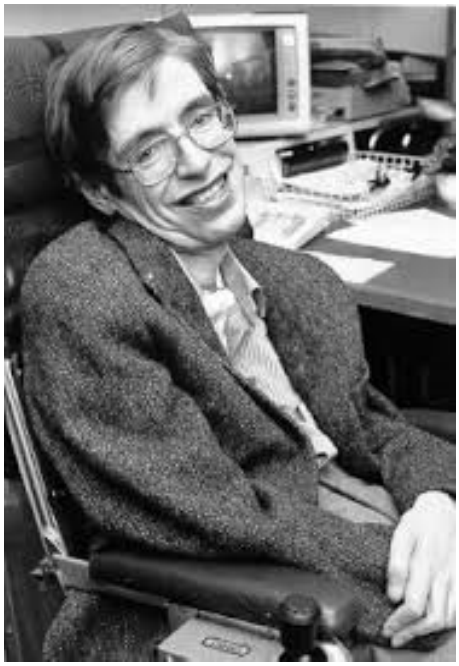
Special Issue

Stephen Hawking 1942-2018



Stephen Hawking one of the foremost scientists of the 20th century, died, sadly, but perhaps appropriately, on March 14, Pi Day, and also Albert Einstein's birthday. Hawking lived almost all his adult life with a neuromuscular disease that left him physically completely helpless, but, as he put it many times, freed his mind to explore the mysteries of the universe. He is best known scientifically for his groundbreaking work on black holes. Over the last twenty or so years he became one of the best known people in the world and an international ambassador for humanity and progress. More than any other person of our time, he was the successor to Newton and Einstein, not only as a scientist, but as a symbol of modern culture, whose influence extended far beyond the laboratory and the classroom.

To members of CVA-

I never met Stephen Hawking. In regards to major scientists, I did meet Clyde Tombaugh once and had a wonderful talk with him(that, however, is a different story for another time). But one of my former students, in fact, the first student from our high school to be accepted into Caltech, met him while an undergraduate there. He visited me a few months later, telling me about his encounter with arguably the most famous scientist in the world. By that time, around 2008, Caltech was like a second home to Hawking. He first went there in 1974 as a visiting professor, and returned for at least short periods almost every year after that. Anyway, Ty was full of excitement and enthusiasm as he described the meeting, and showed me a picture of him next to Hawking in his wheelchair. Hawking probably met dozens, maybe hundreds of young people like that, a few of which he may have remembered, but most probably not. Yet, the inspiration that he gave to people, having done so much with his limited movement and speech, propelled so many of them to bigger and better things(Ty went from Caltech to Berkeley to earn a Ph.D. in theoretical chemistry). Hawking was also one of the few scientists; Carl Sagan being the first to come to mind; to bridge the gap between the laboratory and the man on the street. He could relate to the public, and the public trusted him to be honest and principled. In time, he became a sage, just as Einstein did in his later years, who, not only the pundits, but the everyday people as well looked to for answers. More than anything else, Hawking transcended science and became one of the main spokesmen for our troubled age. This is his real legacy, and he will be remembered long after many of today's so-called leaders are gone and forgotten

Larry Parmeter, editor, *The Observer*

Number of exoplanets found as of March 2018-3,824

How many more are out there?

Tens of thousands? Hundreds of thousands?

Profiles in Astronomy

Stephan Hawking 1942-2018

Hawking was born on January 8, 1942(the 300th anniversary of Galileo's death) in Oxford, England; his father was a medical researcher and his mother was a nurse. He ended up having two younger sisters and an adopted brother. He attended private schools in London, and then went to Oxford for his undergraduate studies(both of his parents were graduates of Oxford). For graduate work, he switched schools and went to Cambridge.

Hawking wanted to study cosmology and quantum mechanics at Cambridge under Fred Hoyle; instead, he was assigned to Dennis Sciama, one of England's leading cosmologists. Sciama guided him through graduate studies, and kept up his morale when he was first diagnosed with ALS(or Lou Gerhig's Disease) at age 22. Hawking said much later that he went into a deep depression for about a year after he learned he had the disease. During his graduate studies, he worked closely with Roger Penrose, one of England's foremost mathematicians, who had been studying what he called singularities. Hawking made singularities the topic of his doctoral thesis, which he wrote and published in 1966. At the same time, he received as well a post-doctoral fellowship at Cambridge; he would stay at Cambridge the rest of his life.

For several years after receiving his doctorate, Hawking and a series of collaborators researched and published a number of papers on singularities. In time, Hawking began to believe that a singularity, or black holes as they are now called, were Lemaitre's "primordial atom," the creation event that began the universe. In 1970, he showed that the event horizon can only get larger, never smaller. In 1972, he took john Wheeler's ideas about black holes, and postulated that they can have only mass, charge, and rotation. In 1974, Hawking proposed that black holes can emit particles, which eventually came to be known as Hawking Radiation. He also postulated that black holes can be caught in a push-pull scenario wherein they eventually explode and spew all their material in space. In the late 1970s, spurred by findings from Russian theorists, Hawking began work on a theory of quantum gravity.

All during this time, his fame shot upward, and he became one of the best known people in the science world. Despite the fact that his disease left him in a wheelchair, he continued his work at Cambridge, and also at CalTech, which he traveled to and worked at at least once a year. Eventually, when a tracheomety in 1986 left him unable to talk, he learned to use a computerized voice synthesizer the he could use with one hand, and later in his life, only a few facial muscles. In 1979, after a series of other professorships, he was elevated to Lucasian Professor of Mathematics at Cambridge, one of the most prestigious academic positions in the world. He was also one of the youngest ever to be made a Fellow of the Royal Society, in 1974.

In 1988, Hawking wrote and published *A Brief History of Time*, a book about physics and cosmology intended for the general public. It proved to be a huge success, and ended up selling over nine million copies. It was eventually made into a movie as well. In 2001, Hawking followed it up with *The Universe in a Nutshell*, which was also a best-seller, and in 2005, he and a collaborator wrote A *Briefer History of Time*, which also sold well. These were in addition to several other books that he wrote on physics, as

well as four children's books, which explained science on their level. In the 1980s and 90s, Hawking, despite his disability(he never tried to highlight it, and insisted that it should have no effect on his work or how people viewed him), increasingly became a spokesperson for science. By 2000, he was probably the best known scientist in the world, on the cover of numerous magazines, appearing on television shows and in movies. Along with the publicity came a number of scientific honors and honorary degrees. Hawking never stopped doing science, though, and, all the time, worked with his graduate students and post-docs at Cambridge. He probed the mysteries of time, worked on quantum gravity, and, revisited his early work, conceding that some of it might have been wrong, and providing new explanations for it.

Hawking was married twice. His first wife was Jane Wilder, who he met through his sister while in graduate school at Cambridge. They were married in 1965, and had three children. Over the years, though, partly due to his disability, and also to differences in religion and personal outlook, they drifted apart, and divorced in 1995. Later the same year Hawking married Elaine Mason, his head nurse. They divorced in 2006. Afterwards, although they never remarried, Hawking and Jane reconciled and stayed close until his death.

In 2007, Hawking experienced microgravity while on a ride in the "vomit comet," the specially padded aircraft that simulates weightlessness for astronaut training in Florida. It was the result of Richard Branson's offering him a seat on the first Virgin Galactic flight into space(which has yet to happen). In 2009, under the provisions of the chair agreement, he had to give up the Lucasian professorship after 40 years. Over 100 institutions worldwide offered him positions, and Cambridge, not wanting to lose him, created a special research professorship for him. He took it, and held it until his death on March 14, 2018.

Some odds and ends about Stephen Hawking

Hawking wrote or co-authored twelve books about science; he also wrote, with his daughter Lucy, five children's books. He wrote and published several dozen scientific papers. He appeared in, or helped to produce fourteen television programs and movies.

In 2017, when his 1966 doctoral thesis was put online by Cambridge University, the site received 60,000 hits in the first day, temporarily crashing it.

In 1982, at an astronomy conference at the Vatican, Pope John Paul II told Hawking, with a smile, that it was alright to explore the universe up to the Big Bang, but not before it. Hawking smiled back.

Hawking won numerous awards and received several honorary degrees. But he never won a Nobel Prize.

In 2016, the Starmus Festival established the Hawking Medal for Science Communication, in recognition to a person who does the most to promote science understanding to the public. The medal was designed by former cosmonaut Alexi Leonov.

Sources: Wikipedia, www.Hawking.org.uk, New York *Times*

Some Famous Hawkingisms

To those who knew him, Hawking had a rich language bank, and a taste for telling bad jokes. Even after he lost his voice, he could still spew out verbal zingers on his computerized voice synthesizer. Some of his more famous sayings are in his books and on the internet. Here are a few of them.

"God not only plays dice, but he sometimes throws them where they can't be seen." (In a reference to Einstein's famous saying that "God does not play dice with the universe.")

"Fame is a nuisance."

"I'm a right-wing socialist."-when asked about his politics

"Please excuse my Russian accent"-in reference to his voice synthesizer

"They say it's Newton's chair, but obviously it's been changed" (In reference to his wheelchair and to the Lusician chair of Mathematics at Cambridge, which Newton held in the late 1600s)

When giving a talk about time reversing inside a black hole: "If anyone wants to know if I'm right, then go jump in a back hole."

"Black holes ain't so black"

"And that is the universe in a nutshell"

Quotes from:
***Lonely Hearts of the Cosmos* by Dennis Overby, 1990**
***A Brief History of Time*, 1988**
***The Universe in a Nutshell*, 2002**

President Barrack Obama meeting Stephen Hawking in the White House in 2009. The President awarded Hawking the Presidential Medal of Freedom for his contributions to science