

# Edwin Powell Hubble: Biography

Often lauded as the father of modern cosmology, Edwin Powell Hubble made several significant discoveries that changed how scientists viewed the universe. Born in 1889, Hubble began his professional life as a lawyer, but returned to school after only a few years to obtain a doctorate in astronomy. After graduation, he was invited to work at the [Mount Wilson Observatory](#) in California, but had to delay his acceptance while he served as a soldier in World War I.



Edwin Hubble, credited with the discovery of the expansion of the universe, at the Mount Wilson Observatory  
CREDIT: : Mt. Wilson Archive, Carnegie Institution of Washington

Upon return to civilian life, he took a position at the observatory, where he was able to work with the two largest telescopes in the world, the 60-inch and 100-inch Hooker reflectors. He left the observatory again in 1942 to serve in World War II, where he was awarded the Medal of Merit. Before his death in 1953, at the age of 63, he oversaw the construction of the 200-inch Hale Telescope on Palomar Mountain, which would be the largest telescope on Earth until the Russian BTA-6 was built in 1976.

## Galaxies outside the Milky Way

In the 1920s, the small, diffuse patches in the sky were termed nebulae, and were thought to exist within the Milky Way. While examining images of NGC 6822, M33, and [M31](#) individually, Hubble noticed a pulsating star known as a [Cepheid variable](#) inside each one. Cepheids are special because their pulsation allows for precise measurements of distance. Hubble calculated how far away each Cepheid lay — and thus how far to each nebula — and realized they were too distant to be inside of the Milky Way.

Astronomers realized that these nebulae were in fact galaxies like the Milky Way, each containing billions of stars. The universe, once thought to be contained by the Milky Way, expanded significantly in the eyes of astronomers.

Around the same time, Hubble published a standard classification system to use for the galaxies. At the time, a descriptive system existed, and two other systems were proposed soon after, but they were insufficient. Hubble's clear method of organizing the various classes focuses on three galactic types: ellipticals, spiral and barred spirals, and irregulars. Known as the "tuning fork" diagram (due to its resemblance to that musical piece), the method organizes ellipticals by their ellipticity (how stretched out they are from a perfect circle), while spirals and barred spirals become less tightly wound as they progress.

Hubble originally thought that galaxies evolved from ellipticals to spirals, but scientists now know that each galaxy's shape is determined in its early life.

## **The expanding universe**

In studying the various galaxies, Hubble was able to determine that they did not sit stationary in space. Instead, virtually every galaxy seems to be [rushing away](#) from the Earth (the [Andromeda Galaxy](#) is instead rushing towards us and will collide with the Milky Way in about five billion years). Astronomers rushed to test his calculations on other galaxies, and found that some were moving as quickly as 90 million mph (40,000 kilometers per second) in the opposite direction.

The calculation to determine the rate at which the universe is expanding is known as Hubble's law, though it was originally proposed by [Georges Lemaître](#) in 1927. According to the calculation, the universe is expanding at a constant rate, known as the Hubble constant.

Over a decade before Hubble published his work, renowned scientist [Albert Einstein](#)'s theory of General Relativity called for an expanding universe. But Einstein removed the equations because they contradicted the evidence of the day. After Hubble had shown the universe was, in fact, expanding, Einstein visited him at Mount Wilson, calling his decision to change the equations, "the greatest blunder of my life."

## **A lifetime contribution**

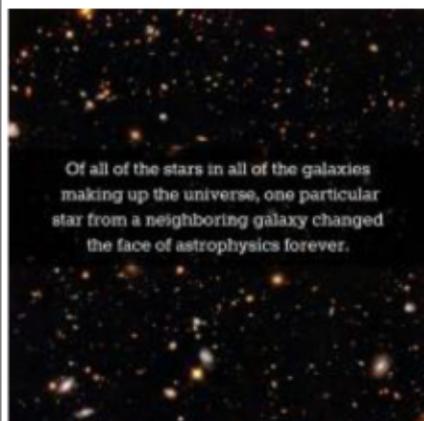
Though Hubble is most well known for these major discoveries, he also made a number of other contributions to the field of astronomy, and numerous awards. But he never received the Nobel Prize, despite his role in improving the existing understanding of the universe. During his lifetime, astronomy was considered a field of physics for the world-renowned Nobel Prize. Hubble labored in vain for a change that would allow astronomers such as himself to be recognized. Unfortunately, it didn't happen until 1953, the year Hubble died. Since the [Nobel Prize](#) cannot be awarded posthumously, Hubble was ineligible.

In 1990, 101 years after Hubble's death, NASA launched the Hubble Space Telescope into orbit around the Earth. The telescope, named for Edwin Hubble, has provided a wealth of information about the cosmos, transmitting hundreds of thousands of images to scientists on Earth. It has allowed for more precise calculations of the age of the universe, shown galaxies in all stages of the universe, and played a key role in the discovery of dark energy, the force causing the universe to expand. [[Celestial Photos: Hubble Space Telescope's Latest Cosmic Views](#)]

## [Hubble Variable 1: The Star That Changed the Universe](#)

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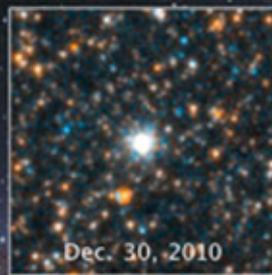
### Hubble Variable 1: The Star That Changed the Universe



A small collection of galaxies (Credit: NASA/JPL)

Today we know that the Universe is filled with billions upon billions of galaxies, but in the early 1900s, it was widely accepted that the Milky Way was a single collection of stars with nothing beyond it. Andromeda, and other galaxies, were believed to just be [‘spiral nebulae’](#) lying within the Milky Way. However, there were telltale clues that astronomers could use to determine the distance between Andromeda and Earth, one of which is Cepheid variable stars. Stars of this type have very predictable patterns of brightness, which we can [derive a light curve from](#) — thus making variable stars reliable distance markers.

In 1920, the astronomers [Shapley and Curtis](#) had a debate of the size of the Milky Way. Shapley’s measurement was of 300,000 light years across, and that the spiral nebulae were much smaller, therefore, they must be part of it too. However, Curtis thought the Milky Way was much smaller, which would leave room for other galaxies beyond the Milky Way. To try and settle the argument, they tried to study supernovae in Andromeda, but because stellar processes were little



understood calculations at the time, their numbers radically differed, and so the stars were not reliable in working out the distance of the spiral nebula. But there was one man – who is now a very famous man – that was determined to uncover the truth about our universe. His name now resides on one of the most powerful probes we have to sent to delve into the depths of the universe; [his name was Edwin Hubble](#).



Several shots of the variable star that in permanently altered the course of modern astronomy. V1 is a special class of pulsating star called a Cepheid variable. They help determine celestial distances.

Hubble spent months during 1923 studying Andromeda using a 100-inch Hooker telescope. Using many exposures and glass plates, he tried to capture the whole nebula. On October the 5th, Hubble was capturing images of one of the spiral arms, the next day he took a second photo and compared the two. He found 3 possible supernovae, one of which dimmed and brightened in a much shorter period than expected. This star was a Cepheid variable star, later called V1 ([The Hubble Variable number 1](#)). Hubble used this to calculate Andromeda's distance, his conclusion was at 1 million light years – over 3 times the suggested diameter of the Milky Way by Shapley. This meant that the nebula could not reside within our galaxy — shattering the general view that our galaxy was all that exists.

We now know that the Galaxy is actually about 2 million light years away from us (give or take 500,000), but his discovery shook the world of astronomy and revealed a much, much larger universe than the one we first thought existed. Hubble went on to find many more galaxies, and later found out [the universe is actually expanding](#). So, V1 was a major step in astronomy and understanding the true nature of the galaxy, and universe we live in!

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## Hubble announces discovery of other galaxies, December 30, 1924

In 1924, American astronomer Edwin Hubble changed our understanding of the universe when he introduced the existence of other galaxies beyond the Milky Way Galaxy. Until then, the Milky Way was thought to be the entire universe.

In the early 1920s Hubble was using Mount Wilson Observatory's new 100-inch Hooker Telescope, the largest of its time, to study spiral nebulae when he identified Cepheid variable

stars, giant stars that vary in brightness over time. He used Henrietta Leavitt's formula to calculate the distance of these new stars using their true and apparent brightness, and realized they were 860,000 light years away,  $8\times$  farther than the most distant stars in the Milky Way Galaxy.

Hubble photographed the Andromeda nebula (see a **photo** below), which he estimated to be as large and hold as much matter as the Milky Way, and could contain three to four billion stars that produce one-billion times the light of the Sun. He presented his findings in a paper at a meeting of the American Astronomical Society in 1925.



Hubble would go on to discover dozens of other galaxies and worked to show that the universe is expanding, an idea that led to the big-bang theory.

NASA honored his achievements by naming the Hubble Space Telescope after him. Launched in 1990, the telescope has gathered important information including measuring the rate of the universe's expansion, the age of the cosmos, and the mass of a super-massive black hole.

## Hubble among Indiana Hoops Hall of Fame inductees



Edwin P. Hubble, far right in back row, with the 1913-14 New Albany High School basketball team. Photo from the New Albany-Floyd County Public Library Indiana Collection.

### NEW CASTLE

Of local note is former New Albany coach and famed astronomer Edwin Hubble. Hubble will be posthumously honored with the Centennial Award, which was created to recognize those who contributed to Indiana high school basketball more than 100 years ago.

As the coach at New Albany, he led the Bulldogs to an undefeated regular season in 1913-14. Hubble's team defeated Jeffersonville, Scottsburg, Salem, and Lexington (Ky.) before losing in the state quarterfinals in Bloomington.

Hubble was highly regarded at Wheaton Central (Ill.), where he graduated in 1906 and at the University of Chicago, where he was a member of their 1908 National Championship basketball team. His coaching tenure at New Albany came early in his career, before excelling in the science field.

A Rhodes Scholar at Oxford and a Ph.D. in Astronomy at the University of Chicago, Hubble made numerous discoveries and contributions to astronomy from the Mount Wilson Observatory in California before his death in 1953. He was the namesake of the Hubble Telescope, which was launched into space in 1990.



**Edwin Powell Hubble**



**Grace Burke and Edwin Powell Hubble  
in front of their home on Woodstock Rd**

# TIME

THE WEEKLY NEWSMAGAZINE

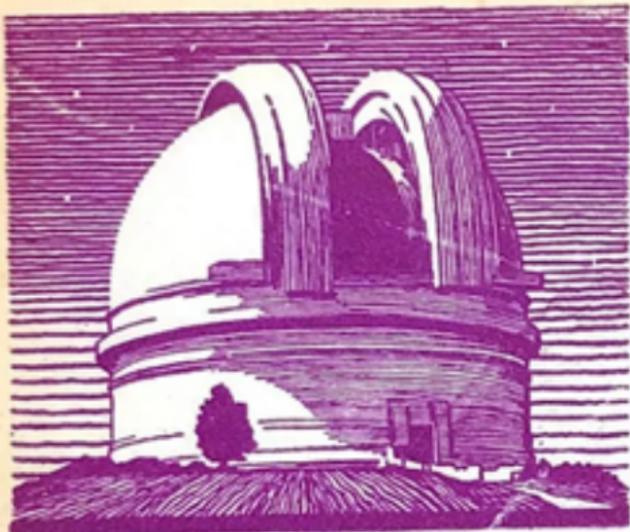


ASTRONOMER BRUCE

Will Johnson's March eye on an exploding planet

(1948)

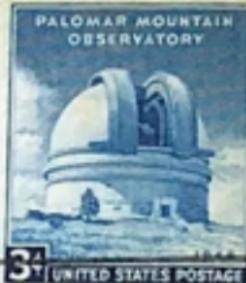
**Feb 1948**



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FIRST DAY OF ISSUE

*Edwin P. Hubble*