

Be Careful What You Erase – Hubble Telescope

PROF.: The “Hubble Space Telescope” could have been named for someone other than Edwin Hubble– if that “someone else” had not been so stubborn!

FORMAT: THEME AND ANNOUNCEMENT

PROF.: Edwin Hubble is famous for two major discoveries: First, he found that the universe is expanding. Second, he discovered that the universe is vastly bigger than anyone had imagined.

Before him, astronomers thought the Milky Way galaxy was the entire universe.

VOICE: How big did astronomers think the universe was before Hubble began his career?

PROF.: About 30,000 light years. But when he discovered that the universe contains **multiple** galaxies, he realized that the universe was **billions** of light years in its immensity.

VOICE: I've read that Hubble was not just an intellectual. During university years, he was involved in sports – including boxing, the high jump, and basketball.

PROF.: He sometimes played tricks such as throwing eggs at other students. Before deciding definitely that he wanted to be an astronomer, he studied physics and law, and then he taught high school for a short time.

VOICE: When he began his career at age 25, he was involved in many aspects of astronomy and cosmology. So articles and books contain expressions like “Hubble's Law,” “the Hubble Constant” and “the Hubble Radius.”

PROF.: Dr. Edwin Hubble lived in the era before radio telescopes. He made many of his observations through the 3-meter optical telescope at the Mount Wilson Observatory in California. When the 6-meter telescope was installed at Mount Palomar, he had the honor of being the first to use it.

VOICE: During those years when they had to rely on optical telescopes, didn't astronomers photograph their observations on glass plates that had been treated with photographic material?

PROF.: Yes. The key to Hubble's discovery was an image he had taken of the Andromeda Nebula on the evening of 6 October, 1923. It was taken in poor weather, on a night when his supervisor advised him to close the observatory dome and go home. In this ordinary-looking photograph, Hubble noticed something exceptional.

VOICE: An exceptional discovery in an unexceptional photo.

PROF.: That's right.

VOICE: If I understand correctly, each photographic plate showed hundreds or even thousands of stars.

PROF.: You understand correctly. But on that plate, Hubble noticed one speck of light that he had not noticed in previous images. He identified that speck as a Cepheid star – an object that was ***not inside the Milky Way.***

VOICE: To observe one change among all the stars on that photographic plate, he must have been extremely familiar with the sky.

PROF.: That's true. “Luck” favors the prepared mind. Hubble was so familiar with the intricate details, that he could recognize one unusual speck of light.

That observation became the key to proving that Andromeda was a distant galaxy, not a part of our Milky Way. And it became the first of many, many galaxies that Hubble and other astronomers would later discover.

VOICE: What did you mean when you said at the beginning of the program, “The Hubble Space Telescope could have been named for someone other than Edwin Hubble– if that ‘someone else’ had not been so stubborn!”

PROF.: University of Chicago astronomer Dr. Rocky Kolb pointed out in a speech to students that another astronomer had photographic plates that hinted that the Milky Way was not the entire universe, but he ignored those hints.

Harlow Shapley [HAR-low SHAP-lee] had begun working at the Mount Wilson Observatory several years before Hubble. Someone showed him that one of his own photos included an unusual astronomical object. This person thought this object was not part of the Milky Way.

Shapley dismissed the idea, insisting that the Milky Way was the entire universe.

VOICE: Who showed him that object?

PROF.: His name was Milton Humason. He had started his career as a mule driver. When he delivered astronomical equipment to the Mount Wilson Observatory in the early 1900s, he became interested in telescopes and started spending some of his leisure time at the observatory. Later he was hired as night janitor there.

Humason had no high school education, but he was a keen observer.

VOICE: How did an uneducated janitor get access to observations of stars and galaxies?

PROF.: He showed so much interest in astronomy, that Shapley let him look at some of his photographic plates. Humason circled an object on one of them with grease pencil ¹ and asked Shapley if this wasn't something outside the Milky Way.

Shapley retorted that it was impossible. He insisted that “everyone knew” there was only one galaxy. He erased the marking and ordered, “Never write on my plates again!”

VOICE: It sounds like the old cliché, “Don't confuse me with the facts. My mind is made up!”

PROF.: Exactly! Dr. Harlow Shapley did make several significant discoveries. He published more than 40 research papers. His observations and calculations revealed where our solar system fits in the galaxy. One obituary calls that “a remarkable achievement comparable to discovering that the Earth orbits the sun.”

VOICE: That was a major accomplishment!

PROF.: But when he resisted the idea that the universe could possibly be bigger than just the Milky Way galaxy, Shapley forfeited the privilege of having historians honor him as highly as they esteem Hubble.

Dr. Rocky Kolb observes, “When Shapley rubbed out the marks, he erased the opportunity to make a [historic] discovery.” By contrast, **Hubble** looked at the same data with an open mind, and he made discoveries that made him famous. If Shapley had listened, “perhaps today we would be enthralled by images from the ‘Shapley’ Space Telescope.”

VOICE: Instead, we have the **Hubble** Space Telescope.

PROF.: Right!

1 A writing device that resembles a wax crayon or chalk.

- VOICE: Hubble advanced the world's knowledge substantially. But he was not awarded a Nobel Prize. Why was that?
- PROF.: There are six categories of Nobel Prizes. Three of them are for scientific fields – one for chemistry, another for physics, and a third for physiology or medicine.
- VOICE: Wouldn't Hubble's discoveries have qualified him for the Physics prize?
- PROF.: Alfred Nobel's will specified what his estate would define as physics. Astronomy wasn't part of it.
One astronomer told me one reason for that is that Nobel's daughter ran off and married an astronomer. So astronomers were *persona non grata* to him.
Later the Nobel Committee changed its definition and decided discoveries in astronomy would be eligible for the Physics prize. But before that policy change went into effect, Hubble had died.
- VOICE: But I have some friends who are as closed-minded on one issue as Shapley was when he insisted one galaxy was the entire universe.
Some of them use the same expression that Dr. Shapley used when rejecting an idea without examining it.
- PROF.: Do you mean the phrase, “Everyone knows”?
- VOICE: Yes. Many of them say “everyone knows” there is no God. Or if there is one, he created everything eons ago and “everyone knows” he (or it) has no interest in us as individuals.
- PROF.: Most major discoveries in science have resulted when someone doubted what “everyone knows” and expanded his vision to consider a new idea. The people who have won Nobel Prizes weren't rewarded for reciting things that everyone else believed. They discovered facts that no one knew before. Quite often the new facts completely contradicted what everyone thought they “knew” before.
- VOICE: Quite often a majority of people can be deceived. A small minority – sometimes only one person – pioneers in discovering a major concept that revolutionizes an entire field of knowledge.

PROF.: So you can advise your friends not to “rub out” from their minds the possibility that God may exist.

Encourage them to look at the various intricacies of nature that we discuss in various episodes. And think about the outstanding scientists that we quote – scientists who believe in God and give logical reasons why they believe.

VOICE: I keep thinking of Dr. Kolb's words, “Be careful what you rub out!” That's why we're talking about the **Hubble** Space Telescope instead of the **Shapley** Space Telescope.

PROF.: And that's why we're talking about the Bible. It's a book that its enemies have tried many times to wipe out over the past two thousand years. Yet it has survived and been translated into more languages than any other book – because it has proved itself true.

VOICE: So “Be careful what you rub out!” Don't let someone else's disbelief deprive you of discovering God for yourself.
Be careful what you rub out!

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