



THEN ONE DAY
IT WASN'T A PLANET.
THE END.

The Truth about

Pluto

by Charles C. Hofer

Once upon a time, Pluto was a planet. Then one day it wasn't a planet. The end. That might be the world's worst bedtime story. But it's also 100 percent true. The story of Pluto is about how things change. Specifically, it's about how things change in light of new evidence. Pluto's story is a story about science.

Following its discovery in 1930, little Pluto captured the imagination of anyone who looked skyward and wondered about the farthest edges of our solar system. Some people preferred Pluto to the ringed beauty of Saturn or the galactic girth of Jupiter. The man who discovered Pluto went from a small-town hero to a national legend nearly overnight. Pluto, the smallest of planets, became a loveable symbol for any underdog.

Then in 2006, astronomers stripped Pluto of its "planet" status and labeled it a "dwarf planet"—whatever that was. Pluto's 76-year run as a planet was over.

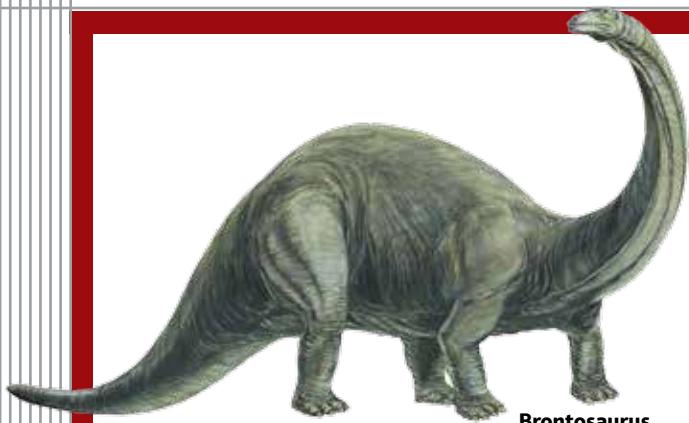
Do you feel bad for the spunky little planet? Or do you agree with the decision to demote Pluto? Read on, and then decide.

The Dawn of Science

Today we take it for granted, but science, as we know it, has thrived in the Western world for only a little more than 300 years. Prior to that, people often guessed at how the natural world worked. The reason the sun rises and sets, why birds disappear during the winter months, how we sicken, how we heal—educated guesses, traditions, and religious faiths explained all of these natural phenomena. No rigorous way existed to test new ideas about our world.

Then stargazers started to notice that heavenly objects didn't behave the way tradition said they should. In the early 1500s, Polish astronomer Nicolaus Copernicus proposed an idea that shook the world when he suggested that the Earth and all the other planets revolve around the sun, instead of the other way around. Many refused to accept Copernicus' ideas.





Brontosaurus

THE NAME GAME

Nicknamed “the thunder lizard,” the Brontosaurus was one of the largest animals to ever walk the Earth. Then one day the Brontosaurus just vanished. This wasn’t another extinction. This time around, Brontosaurus fell victim to a naming glitch.

Scientific tradition dictates that when a new organism is discovered or identified, it’s assigned a two-word Latin name. For example, *Homo sapiens* is the fancy name for a human. This naming device is called the Linnaean System, named for its originator, the eighteenth-century naturalist Carl Linnaeus.

Brontosaurus is a genus, or group of closely related species, first identified in 1879. A similar genus called Apatosaurus was identified two years earlier.

During the 1900s, paleontologists reviewing the evidence concluded that Apatosaurus and Brontosaurus are actually the *same* genus. Since scientists named Apatosaurus first, Linnaean rules say the giant beast must be called Apatosaurus. Uh oh. The news hit Bronto fans like a giant meteor.

In 2015, an exhaustive study re-examined similarities between Brontosaurus and Apatosaurus. The results showed enough differences between the two dinosaurs to separate them on the family tree. So Brontosaurus is back—for now.

—Charles C. Hofer



Apatosaurus



Captions can go in this neat-o box or just hang loosely. This box can go on the top or bottom. This works great as an overlay on an image.

A century later, Italian astronomer Galileo Galilei revisited Copernicus’ ideas, this time with the help of more advanced telescopes. By observing the movement of planets, Galileo proved Copernicus’ theory correct.

Galileo’s work is an early example of the scientific method in action. “These observations turned Copernicus’ hypothesis into a proven theory,” says Veronica Bray, a planetary scientist at the University of Arizona and part of the NASA team responsible for the New Horizons spacecraft that flew past Pluto in 2015. “It shows that no matter how unpopular a result, scientists will update their opinions in light of newly discovered information.”

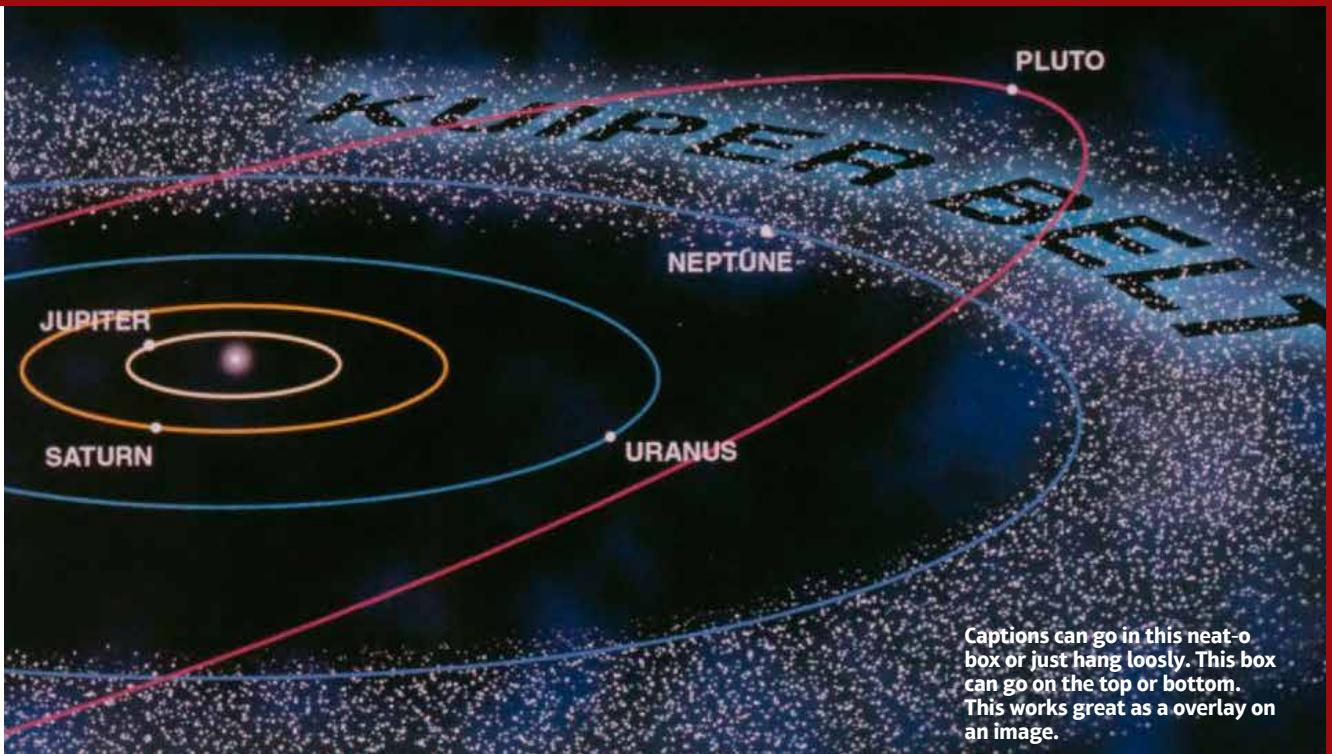
The scientific method provides a framework to subject new ideas to rigorous testing. Using this method, scientists test and improve their ideas, called hypotheses or theories, by performing experiments or making observations. Only after passing these tests can ideas become accepted scientific knowledge.

Most important to Pluto’s story, the method calls for scientists to re-examine old ideas in light of new evidence. This evidence might arise from a fresh discovery or a technological innovation. The scientific method provides a tool to question everything that we assume to be true . . . even the number of planets in our solar system.

The Search for Planet X

By the twentieth century, astronomy had come a long way since the days of Copernicus. Advances in telescopes and other technologies led to discoveries of distant moons and comets and other space bodies. But scientists had observed only eight planets. Some astronomers were convinced that another planet lay beyond Neptune. This mysterious planet became known as Planet X.

In 1930, while working in the Lowell Observatory in Flagstaff, Arizona, young astronomer Clyde Tombaugh tested some planet-hunting techniques. By applying some new tweaks to old methods, he shed light on the darkest corners of our solar system. Before long, Tombaugh discovered Planet X! An 11-year-old in England named Venetia Burney suggested calling the planet “Pluto.” The world celebrated. Our solar system was complete.



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However, even as Pluto gained recognition as a planet, doubt began to arise. Here's why: the planets in our solar system fall into two main categories. First there are the terrestrial planets of Mercury, Venus, Earth, and Mars. These planets are small and solid, made of rock and ice. They are close to the sun. Then there are gas giants, represented by Jupiter, Saturn, Uranus, and Neptune. These planets are massive, ringed, and composed mainly of gas. While the terrestrial planets and the gas giants are very different from each other, all planets clearly fall into one category or the other. **Pluto, however, did not.**

Naysayers argued that tiny Pluto didn't deserve planet status. Pluto was too much of an oddball. Others argued that the little celestial body had *enough* characteristics that other "official" planets possessed. Astronomers debated back and forth about the true nature of Pluto.

The "No's" Have It

It all began to unravel for Pluto in 2005. The Kuiper Belt, an area at the edge of our own solar system, is home to countless space rocks, large and small, including Pluto. Many astronomers believe the Kuiper Belt is made up of debris that drifted away when our solar system was formed.

Astronomer Mike Brown of the California Institute of Technology was convinced that rocks the size of Pluto—and perhaps even larger—existed in the Kuiper Belt. In 2005 he finally found one. It's called Eris.

Now Pluto was understood as one large object in the Kuiper Belt, among others. Its days as a planet were numbered. At the annual meeting of the International

Astronomer's Union (IAU) a year later, astronomers present held a vote. Is Pluto a planet? The answer was a clear "NO." The IAU voted to change Pluto's status. And *that* was the end of Pluto as the ninth planet.

The End?

Of course, an entire planet can't just vanish. The IAU demoted Pluto to a "dwarf planet," a new classification that includes Eris and fellow Kuiper Belt dwellers. The world reacted in dismay. After all, for many, tiny Pluto had become *the* favorite planet. But science isn't a popularity contest.

"Pluto was the first Kuiper Belt object discovered," says Bray. "Over time, more and more Kuiper Belt objects were discovered. We realized we'd had it wrong all along." New evidence about the Kuiper Belt allowed scientists to re-examine what we thought we knew about our solar system. As a result, we updated how we classify planets. For Pluto, the rules of the game had changed.

"Once you get to see the variety of worlds that are out there, you realize that it doesn't matter what it's called," says Bray. "Pluto is still as cool and complex as it ever was!"

Science keeps moving forward. Today's scientists are asking questions that the next generation will answer. And you never know. With new scientists applying fresh ideas, the story of a possible ninth planet is far from finished.

Charles C. Hofer is a biologist living in Arizona, where he waits patiently for the IAU to reconsider its decision about Pluto.