Exploring the cosmic universe of Edwin Hubble

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In 1925, Harlow Shapley, director of the Harvard College Observatory, received "the letter that has destroyed my universe."

Edwin Hubble, his rival — a "stuffed shirt," with a phony English accent who couldn't "write an inter-office memo that didn't sound like the Preamble to the Constitution" — had demonstrated that the outer parts of two spiral nebulae, Andromeda and Triangulum, were "dense swarms of actual stars."

The universe, it turned out, was a thousand trillion times larger than astronomers had believed, and it was filled with galaxies much like our own Milky Way.

Bartusiak chronicles the cosmic explorations that helped make Hubble a star. A journalist specializing in science, she knows how to cut to the chase. Her account is informative, dramatic, and accessible, without being dumbed down.

She sings songs to unsung heroes. Henrietta Leavitt is one of them. A graduate of the Cambridge, Mass., institute that became Radcliffe College, Leavitt worked at the Harvard Observatory at the turn of the century. Peering through a magnifying eyepiece at a special group of stars, later known as Cepheid variables, she used the relationship between the steady rhythm of a Cepheid's oscillation and changes in its luminosity to determine the distances to far-off celestial objects. Her boss, however, had chosen her "to work, not to think." He denied her access to the best telescopes and assigned her to another task. Leavitt died of stomach cancer in 1921 at 53.

Of all the sciences, Bartusiak notes, astronomy attracted the greatest popular interest and philanthropic support in the United States in the early 20th century. After all, it supplied a shiny white dome on a mountain, suitable for star-gazing. Nonetheless, she reminds us, using Henrietta Leavitt as a paradigmatic example, at "the very core of astronomical work, the endeavor that is never glorified," are scientists hunched over desks, far from their telescopes, poring over data and running the numbers.

Demonstrating that science is an inherently collaborative enterprise, Bartusiak suggests as well that cosmic discoveries can be humbling as well as inspiring. For Albert Einstein, Hubble's "aha moment" meant the beginning of the end of his cosmological constant, which posited that the universe was filled with matter, finite, stable, immobile and closed. When George Lemaître, a Jesuit priest, proved that galaxies were expanding, as space-time inflates without end, the world's premier physicist threw in the towel. "The red shift of the distant nebula," he announced, "has smashed my old construction like a hammer blow."

The "remarkable number of nebulae" was, of course, humbling in another way as well. Much like Copernicus, who removed Earth from the center of the solar system in the 16th century, astronomers in the modern era relocated the sun from the heart of the Milky Way — and proclaimed that our galaxy was merely one of many.
The whole system “is off center,” Shapley declared. To those who insist that “we are at the center because we are God’s children,” Shapley could now counter, “here was an indication that we were perhaps incidental. We did not amount to much.”

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**The Day We Found The Universe**

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