The Carob Tree

Or, planting seeds for the future

There is a story from the Talmud, the ancient Jewish text, of a young man walking down a road. He comes across an old man working under the hot sun, planting a carob tree. The young man asks the old man why he is planting the tree; surely the old man knows that he will be long gone before the carob will bear fruit. The old man replies that when he was young, there were carob trees bearing fruit and that someone must have planted them.

Astronomy has a way of touching us in a deep way: spiritually, religiously, and intellectually. Any way you look at it, astronomy is about our origins and our place in the order of things.

I am what you might call an advanced amateur astronomer. While I have a degree in the field, I've only practiced in minor ways professionally. However, my background gives me the tools to perform and interpret some relatively sophisticated observations with pretty simple astronomical equipment.

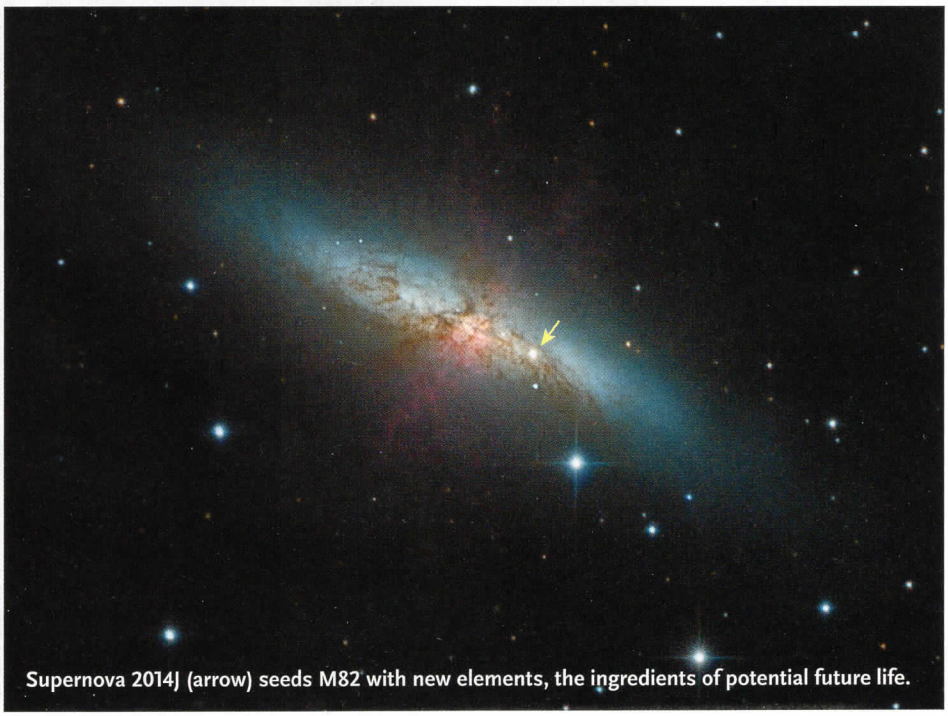
In January of last year, supernova 2014J erupted in the nearby active galaxy M82 in Ursa Major. It was the closest supernova in decades and as such was one of the brightest. I had recently acquired a low-resolution grating for spectroscopic imaging. With an 8-inch telescope I was able to take spectra over a period of two months and watch the evolution as the expanding shell of debris slowed.

Additionally, I could identify a number of lines in the spectrum, including the dramatic silicon line at 635 nanometers and numerous iron lines. I had read that supernova explosions produced iron and elements heavier than iron. I wondered: How much is actually produced? The answers I found in a literature search had significant uncertainties, but the important thing is the unit of measure: solar masses! Given that the Sun has a mass about 300,000 times greater than Earth's, this is a truly staggering amount of iron, not to mention other heavy elements, that each supernova heaves into the galactic environment.

Astronomy is not only a field of deep space; it is one of deep time. For me, the realization of how much iron a single supernova produces — enough to form hundreds of thousands of Earth-like rocky worlds or cores of gas giants — brings home the metaphor of the carob tree. Supernovae spread the seeds of future solar systems, future planetary systems, and future biospheres.

M82 lies about 12 million light-years away, so the explosion we witnessed last year took place 12 million years ago. Millions, perhaps billions of years in the future, its ashes will be incorporated into new worlds and maybe new life — just as our solar system formed billions of years ago, with life on Earth to come.

Just as the old man will never see the fruit of the carob tree he plants, our civilization and species will never see what fruit is born out of 2014J. But it is an assurance that the materials for continuing life are present in the unimaginably distant future in a faraway galaxy. For me, insights like these grant astronomy its profound allure. ✦



Supernova 2014J (arrow) seeds M82 with new elements, the ingredients of potential future life.

S&T: KELLY BEATTY / SEAN WALKER

Steven Hill *looks up at the stars through transparent Colorado skies from his home in Denver. During the daytime he helps monitor the Sun for NOAA's Space Weather Prediction Center.*