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Under the Flint Hill Sky: Reflections on the Legacy of Annie Jump Cannon

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Flint Hills Sky
Kirk Decker

UNDER THE FLINT HILLS SKY: REFLECTIONS ON THE LEGACY OF ANNIE JUMP CANNON

Our ancestors sought solace—inner peace or comfort—by looking up. Sometimes the look was purely spiritual, the desire to commune with something larger than the individual. And other times it was surely to reflect on what is out there and our relationship to that larger context.

Meaning and our relationship to the beyond came in a number of forms. One form was the stories that were told as the viewer imagined patterns of stars in the sky based on familiar objects. Ah, constellations. And these patterns often generated stories, mythology. Mythology even served as an explanation for what was observed of the “out there,” of our understanding of the larger context of the universe.

Consider the following: on a typical summer night, barring the obscuring light of a gibbous or full moon, we see the brush of light that we call the Milky Way. Today we think that we understand that brush of light as a myriad of stars whose individual light blends with its neighbor’s light and thus produces a diffuse, milky appearance. It is as though we are in the midst of a vast, flat, disc-like arrangement of stars. We interpret the blend of starlight as the result of being near the edge of the disc of visible stars and

viewing toward the center of the plane of the disc—toward the center of the vast array of stars known as the Milky Way galaxy. Humankind has transitioned from the smug perspective of being at the center of the universe to acceptance of the evidence that we are inhabitants of this special, solitary rock, the earth, one of several rocks orbiting the life-giving energy source of a special star, the sun.

But our ancestors, those tending livestock on the open plains under a starry canopy, had their explanations of this brush of light. How so? Low above the summer southern horizon at the base of the Milky Way is a pattern of stars that was visualized as a teapot. When heated, teapots produce steam. The steam rising from the imaginary teapot (the constellation Sagittarius) might be the brush of light that we know as the Milky Way. In that way mythology provided for the ancient observer an explanation of a feature in the larger realm of one's existence. That conception provided an apparent understanding and acceptable level of peace and comfort.

As a youngster growing up on a farm in north-central Kansas, I would sometimes do field work under a hot July night sky. The tractors had lights, but I would often

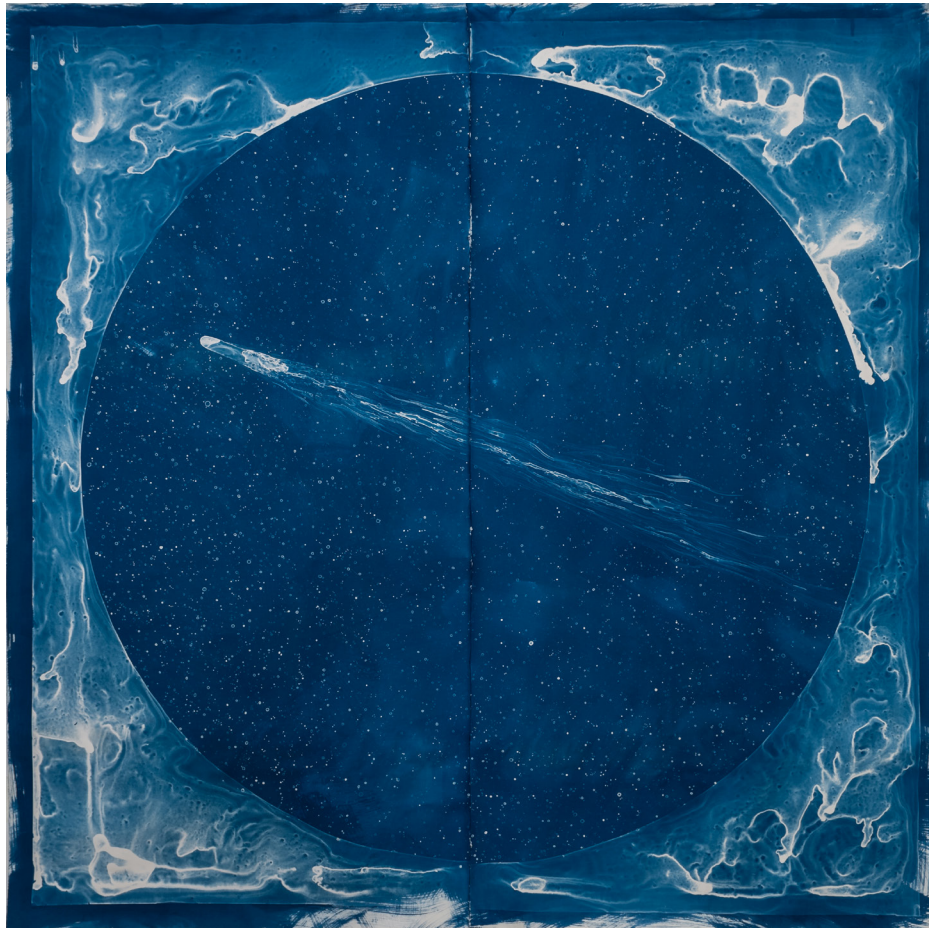
turn them off, marvel at the red glow of the exhaust manifold of the tractor, and gaze up at the heavens above. I was intrigued, and I pondered. Later, when my path in life far transcended the farm, I found my enduring academic interest while in my first graduate school stint at Harvard. I came to understand more about the realms of planetary and space science. And at Harvard a nexus with the legacy of Annie Jump Cannon occurred and enabled its sharing with my career at Emporia State University.

Who was Annie Jump Cannon (1863–1941)? Influenced by her mother who introduced her to the constellations and later encouraged the love of astronomy, she was among the first women in Delaware to pursue a college education. At Wesley College in Delaware, then at Wellesley and Radcliffe Colleges in Massachusetts, she nurtured her interest in and aptitude for mathematics and physics. This provided the foundation for her career at the Harvard College Observatory (HCO) when HCO Director Edward Pickering consciously sought women as observatory staff. Cannon's enduring legacy began in response to that initiative in 1896.

Her pioneering work with the classification of spectrograph images



Annie Jump Cannon (1863-1941), sitting at desk
Smithsonian Institution Archives. Image # SIA2008-0647



Comet, after Annie Jump Cannon

Lia Halloran, courtesy of the artist and Luis De Jesus Los Angeles

of stars culminated with the Harvard system of stellar classification, which was subsequently adopted by the International Astronomical Union in 1922. The classification of more than 300,000 individual stars between 1910 and 1935 was contained in various catalogues, but principally in editions of the Henry Draper Catalogue.

In 2019 we commune under virtually the same giant canopy that Annie Jump Cannon would have known as she and her Harvard associates provided the foundations for the advancement of our understanding of stellar spectra and stellar life cycles. They codified simply with the letters O, B, A, F, G, K, and M. For example, O and B stars are higher mass, and M stars are lower mass (which determines virtually all of a star's subsequent characteristics and history); O and B stars are hotter, and M stars are cooler; O and B stars radiate energy at shorter wavelengths and will thus appear bluish in color, whereas M stars will appear reddish because they radiate light at longer wavelengths; and following their births, O and B stars convert their nuclear fuel to light energy more rapidly, and thus will have predictably shorter lifetimes as stars in contrast to M stars. The work of Cannon

elucidated astronomers' understanding of distinctive star characteristics as well as stellar life cycles from birth to the death of a star.

In addition to pioneering work in astronomy, Cannon's life and career were characterized by challenges, barriers, and "firsts". Cannon was deaf, perhaps as a consequence of scarlet fever in the early-to-mid 1890s. She was elected to membership with the Royal Astronomical Society (Europe, 1914) at a time when it was exclusively a male bastion. She was the first woman voted to membership of the National Academy of Sciences; ostensible opposition to that was based on her deafness. Cannon was among the first women conferred with honorary doctorates (University of Groningen, 1921; Oxford University, 1925). Also, she was the first woman elected as an officer of the American Astronomical Society. Yet her legacy reflects altruism and numerous instances of her work that advanced the stature of male contemporaries. The Annie Jump Cannon Award of the American Astronomical Society provides what she did not experience: encouragement and recognition of outstanding contributions to astronomy by women in the early stages of their careers.

Her scientific insights may seem dwarfed next to the poignancy of this quotation attributable to Cannon:

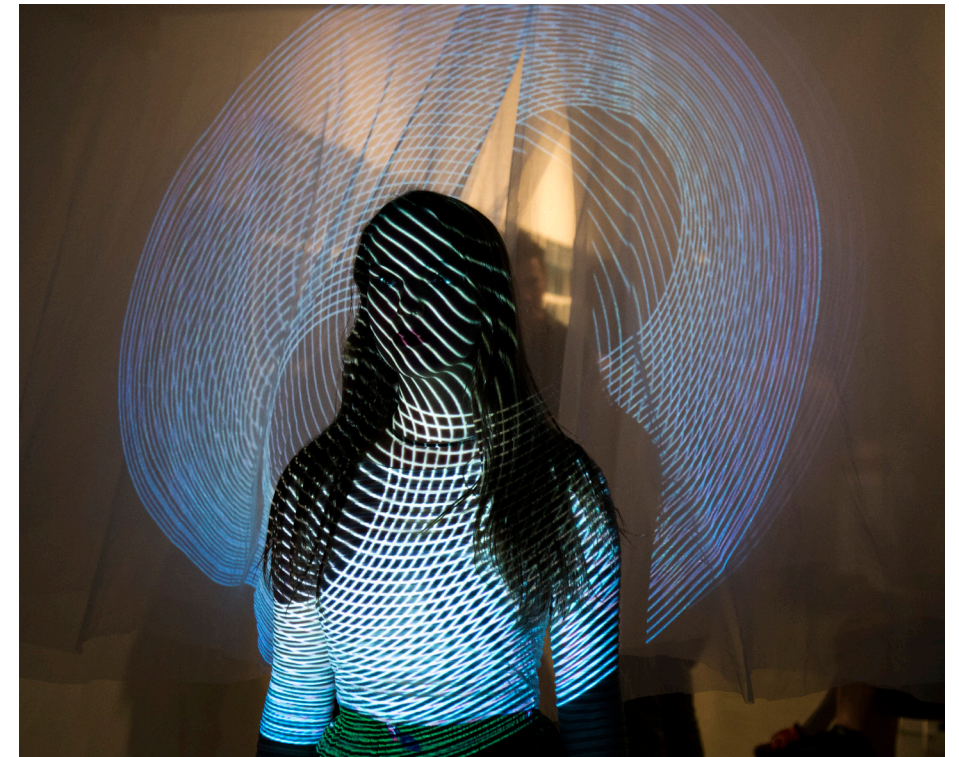
In these days of great trouble and unrest, it is good to have something outside our own planet, something fine and distant and comforting for troubled minds. Let people look to the stars for comfort and find solace as others have.

Perhaps we might amplify *Ad Astra Per Aspera*—to the stars through difficulty—with the exhortation of Cannon to be reflective on “what’s up?”

What a marvelous sentiment from the same voice that gave us enduring insight to the nature of stars—relationships among their relative masses, temperatures, and a myriad of associated variables that let us deduce the life histories of individual stars based on the position and number of dark lines in the spectrum of each. Our social and political context may differ,

but we experience our own brand of turmoil. And under this giant canopy of the remarkably pristine skies of the Flint Hills that endures, may we find solace—an inner peace or comfort—unique to our individual and collective circumstances. That is our longing on the occasion of the fourteenth anniversary of the Symphony in the Flint Hills.

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An Invocation: The Gate
Jonathan Sims