

## Capturing the Stars: The Untold History of Women at Yerkes Observatory

### Introductory Panel

Women contributed to the advancement of astronomy and astrophysics at Yerkes Observatory in the early twentieth century. Women were not only calculators or assistants. They earned degrees, conducted their own research, collaborated on projects with peers of both sexes, worked on publications, and used their time at Yerkes to launch a wide range of careers. Their lives and labor are all but invisible in public records, but their contributions to science—and their voices—are preserved in the University of Chicago’s Special Collections Research Center. This exhibit draws upon library materials to tell the stories of just some of the more than 120 women identified in the University’s archival record by an interdisciplinary research team of astronomers, librarians, and historians.

Join us as we learn more about the scientific work and the lived experiences of women who contributed to the advancement of astronomy and astrophysics in early twentieth century America.

- Learn how the women of Yerkes Observatory contributed to the advancement of astronomy and astrophysics
- Discover why Yerkes Observatory was a uniquely welcoming place for women in early twentieth-century America
- See the essential ways that all labor at Yerkes Observatory contributed to science

### Acknowledgements Panel

This exhibition was curated by Andrea Twiss-Brooks, Director of Humanities and Area Studies at the Library, and Dr. Kristine Palmieri, Postdoctoral Researcher, at the Rank of Instructor, at the Institute on the Formation of Knowledge.

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### Life at Yerkes

Opening in 1897 and situated on Geneva Lake, Wisconsin, the Yerkes Observatory was far enough from the lights of Chicago and Milwaukee that astronomers and astrophysicists could carry out cutting-edge research with the world’s largest refracting telescope. At the same time, its location next to the town of Williams Bay meant that the Observatory was uniquely accessible to women. Williams Bay was easy and safe to reach by train from Chicago, even for young women travelling alone. Women could find accommodations at local establishments like Mrs. Sawyer’s guesthouse, enabling them to live near Yerkes without violating early 20<sup>th</sup>-century standards of decorum. Many observatories of the day had accommodation for men in dormitories, which were not available to women. Social life at Yerkes was adapted to observatory labor. In the summer months, swimming, picnicking, golfing, and painting were among the favorite activities of the Yerkes community.

*Item Labels:*

**Marguerite van Briesbroeck**

*Yerkes Observatory*

Watercolor on paper

*Untitled*

Glazed ceramic

*On loan from Lucinda Rademaker*

Members of the Yerkes enclave used leisure time to pursue various entertainments, including arts, music, and birdwatching.

**Edwin Brant Frost**

*An Astronomer's Life*

New York: Houghton Mifflin Company, 1933

QB36.F9A3 Gen

Edwin B. Frost (1866-1935) was the second director of the Yerkes Observatory (1905–1932) and editor of *The Astrophysical Journal* (1902–1932). He continued in both positions even after losing the use of his right eye in 1915 due to a detached retina, and then becoming fully blind in 1921.

Frost's research focused on spectroscopy of stars, mainly to determine their radial velocities via the Doppler shift. As director, Frost was known for his internationalism and the global scope of his scientific interests. Until now, he has not been known for his role supporting the advancement of women in astronomy.

Letter from Edwin B. Frost to Mildred Roosa, July 13, 1915

Letter from Edwin B. Frost to Harriet Parsons, August 25, 1915

*Yerkes Observatory, Office of the Director Records*

Frost took care to ensure that new staff arrived at the Observatory and settled into the community with ease. Many women received similar instruction letters from him, often with copies of the train schedule, advice on the best route, and suggestions to bring golf clubs and bathing costumes.

Letter from Edwin B. Frost to Caroline E. Furness, November 29, 1917

*Yerkes Observatory, Office of the Director Records*

As director, Frost had the power to permit or prevent women from participating in the work of the Observatory. As a self-identified suffragist—someone who believed women deserved the right to vote—Frost was also an ally for women in astronomy. This played a significant role in making Yerkes Observatory a welcoming place for women.

Directory of Williams Bay Hotels [reproduction]

*Bay Leaves* Volume 1, No. 7, June 15, 1933

*Courtesy of the University of Wisconsin-Madison Libraries*

Photo of Harriet M. Parsons of Yerkes Observatory in her bathing costume, 1919 [reproduction]

*Yerkes Observatory, Office of the Director Records*

Railroad map of Illinois, 1918 [reproduction]

Illinois Public Utilities Commission

Chicago: Rand Mc Nally, 1918

## Science at Yerkes

In the early 20th century, astronomers at Yerkes Observatory monitored the sun; mapped the Milky Way with photographic plates; discovered and catalogued binary stars; measured the positions, motions, and distances of stars; determined apparent stellar brightness and color; explored the nature of the bright and dark nebulae; and analyzed spectra.

These activities were driven partly by advances in thermodynamics and atomic structure, and partly by an influx of astronomical and astrophysical data, obtained thanks to a new generation of instruments. Specialized telescopes were used for both solar and nighttime observations, often aided by the attachment of a spectrograph to reveal spectra. And, while some measurements were still done visually, Yerkes staff increasingly recorded light on photographic glass plates.

The Yerkes Observatory was a largely self-contained laboratory for both research and graduate-level teaching. It housed the world's largest lens-type (refractor) telescope as well as a number of smaller instruments, including a mirror-type (reflector) telescope that could record even fainter patches of light. It also contained machine shops for constructing custom instruments, grinding and polishing engines for fabricating lenses and mirrors, and dark rooms for developing glass plates.

## Astronomy

Astronomers study the night sky to identify, describe, and classify objects in space. In the nineteenth and early twentieth centuries, astronomers around the world undertook large-scale mapping projects to create more accurate and complete maps of the positions of stars and nebulae. Important as navigational aids in a world without GPS, these atlases and catalogs were also vital repositories of scientific knowledge. They presented fundamental knowledge to the scholarly community and served as essential reference works for further research. Astronomers also conducted detailed analyses of specific objects, such as determining the orbits of comets in the solar system and identifying the atoms present in spectra of stars, to learn more about the nature of celestial objects. Thanks to increasingly powerful technological equipment and the more precise measurements, it was possible to determine the distances of stars by measuring their trigonometric parallax. At Yerkes Observatory, women contributed to all areas of astronomical research.

### *Item Labels:*

#### **Emily Dobbin**

*The Orbit of the Fifth Satellite of Jupiter*

Chicago: s.n., 1903

QB404.D6 Gen

Emily Dobbin completed this thesis to become the first woman to graduate from the University of Chicago with a master's degree in astronomy. During her time at Yerkes, Dobbin also assisted E. E. Barnard with his work. She was never thanked by name by Barnard in print, but inclusion of her name and handwriting in archival documents of Barnard's observations of the star 61 Cygni reveal her involvement.

Glass plate, March 2, 1921

R4242, V Tauri

### *University of Chicago*

This plate is marked for measuring. A measuring engine, similar to the one located in the large case in this gallery, uses two dials—one that controls movement along the X-axis and the other along the Y-axis. By turning these dials, a measurer maneuvers a plate into position, so that the object to be measured is centered in the field of view of the microscope. Multiple objects to be measured on a single plate are marked with circles. The black lines connecting the circles guide the measurer from position to position without needing to remove their eye from the eyepiece of the measuring engine.

Glass plates, July 8, 1916  
UV1562/1563, Kapteyn +45  
Glass plate, March 8, 1920  
R 4101, Kapteyn +45

### *University of Chicago*

Alice H. Farnsworth used these plates to complete the publication *Zone 45 of Kapteyn's selected areas: Photographic photometry for 1550 stars* after J. A. Parkhurst's death in 1925.

### **Frank E. Ross and Mary R. Calvert**

*Atlas of the Milky Way*

Chicago: University of Chicago Press, 1934  
QB819.R8 c.4 Gen

### Focus Panel: New Science, Old Plates

Since early 2019, the undergraduate research assistants, led by University of Chicago professor Richard Kron, have been measuring the brightness of stars on century-old photographic glass plates held in the collection of Yerkes Observatory. Once a plate has been digitized (using commonly available equipment), the next steps involve calibration over a large range of stellar brightness. This plate-specific calibration is made challenging by the non-linear response of the photographic emulsion to illumination, and also the quirks of the digitizers. Two papers have been published on the methods so far developed, each testing a single plate (a 1901 small field pointing out of the Milky Way, and a 1905 large field pointing into the Milky Way). The plates each contain thousands to tens of thousands of stars, useful for time-domain studies over a long time baseline. This work complements that being done with other collections of early astronomical photographs. The Yerkes collection includes tens of thousands of spectrograms, many of which are of variable stars. The student group is currently exploring the scientific potential of spectrograms taken at Yerkes in the late 1920s.

## Photography

By 1900, photography had transformed the study of astronomy. It did not entirely replace visual observations, for there were cases in which the human eye was better able to discern detail than the chemically treated glass plates used in photography. Photographs were nevertheless increasingly important for three main reasons: (1) the longer the exposure, the fainter the stars that could be recorded; (2) once exposed and processed, plates were highly stable and permitted accurate and precise measurement; (3) plates could be saved and stored, which meant that images of the sky at specific moments were available for future research.

*Item Labels:*

Letter, Eastman Kodak Company to Edwin B. Frost, January 5, 1917

*Yerkes Observatory, Office of the Director Records*

Photographic plate technology evolved rapidly in the years between 1900 and 1930. This was in large part due to collaborations between observatories like Yerkes and plate manufacturers such as Eastman Kodak.

Plate boxes, n.d.

*Yerkes Observatory Records, Addenda*

Eastman Kodak Company

*Elementary Photographic Chemistry*

Rochester: Eastman Kodak Company, 1931

*Yerkes Observatory Records, Addenda*

This book was used in the darkroom at Yerkes Observatory.

Yellow filter plates, n.d.

*University of Chicago*

Astronomers often used different filters to help them gather information about a particular object. Particular information may be enhanced with one filter and suppressed with another. This yellow filter blocked blue light to simulate the response of the human eye to starlight.

Glass plate holder, n.d.

*University of Chicago*

Bolted in place of the eyepiece, this plateholder turned the telescope into a camera. There is a short video clip demonstrating this transformation on view in the gallery.

## Astrophysics

Astrophysicists work to determine the physical nature of stars and other celestial bodies. They use their knowledge of terrestrial physics to interpret astronomical data. Today, astrophysicists use sophisticated instrumentation and computer-aided analysis in their research. But in the early twentieth century, astrophysics was an emerging field and stellar spectra were the primary sources of astrophysical information.

Spectra are made by splitting light into its constituent wavelengths using a disperser such as a prism or a diffraction grating. Think of a rainbow—a spectrum of visible light.

The advent of photography made it possible to capture spectra permanently on glass plates. These spectra could then be studied in extreme detail by using measuring engines—including the one to your right in the wall case. This made it easier to study what astronomical objects are made of and to determine their radial velocities—the speed at which they moved in a direction away from or towards the Earth.

*Item Labels:*

Data table, July 1, 1925–June 30, 1926

*Yerkes Observatory, Office of the Director Records*

Large plate holder, n.d.  
*University of Chicago*

Glass plate, April 23 and April 27, 1906  
SS172, Kappa Cancri  
*University of Chicago*

These spectra show the change in radial velocity of Kappa Cancri, a binary star system. Plate A shows the approach, and Plate B shows the recession.

Glass plate, October 6, 1910  
OP 385  
Glass plate, October 15, 1910  
OP 410  
*University of Chicago*

These objective prism (OP) plates show the spectra of all the stars in a photographic field.

Glass plates, n.d.  
1B 5800, 1B 6088, 1B 6127, 7 E Aurigae  
*University of Chicago*

Both Dorothy W. Block and Evelyn Wornham Wickham worked with these plates while they were graduate students at the Yerkes Observatory.

### **A. Vibert Douglas**

“Spectroscopic Absolute Magnitude and Parallaxes of 200 A-Type Stars” [reproduction]  
*Journal of the Royal Astronomical Society of Canada*, Vol. 20, 1926

A. V. Douglas earned her PhD in Astrophysics from McGill University in 1926. She spent time at Yerkes Observatory as a graduate student and her dissertation used a large collection of plates from Yerkes.

## The Women of Yerkes

Women found their way to Yerkes Observatory for many reasons. Some came as graduate students or independent researchers. Others were Williams Bay locals and were hired to perform specific tasks or had family employed at the Observatory. Some worked at Yerkes for just a summer or two, while others remained at the Observatory for decades. Their official job titles ranged from Assistant, Computer, Stenographer, Bookkeeper, Librarian, and Colorist to Visiting Assistant Professor.

The women of Yerkes participated in every stage of scientific research conducted at the observatory. They made observations with the institution’s many telescopes—including the 40-inch refractor. They measured plates and spectra. They calculated stellar positions, parallaxes, and magnitudes. They maintained the equipment. They took and developed astronomical photographs as well as spectra. They analyzed astronomical and astrophysical data, and prepared their research findings for publication. Sometimes these women were credited for their labor in the acknowledgements sections of papers written by their male peers, sometimes they were recognized as editors or co-authors, and sometimes they wrote articles under their own names. And, if their labor failed to receive recognition in print, as in the case of stenographers and colorists, our archival materials serve to correct the record.

## Networks

Some, but not all, of the women who worked at Yerkes were graduate students. They hailed from women’s colleges such as Smith, Mt. Holyoke, and Vassar, where pioneering women such as Caroline

E. Furness and Mary Murray Hopkins taught in small but ambitious departments of astronomy. Women like Furness and Hopkins had themselves spent time at Yerkes, and they used their connections—especially with Director Frost—to place talented students at the Observatory. By mentoring these women as undergraduates and helping them obtain positions at Yerkes, they established powerful networks among the women’s colleges and the observatory, which enabled many women to pursue advanced degrees in astronomy and astrophysics. These networks were an essential conduit for women into these fields, especially for those without familial connections to astronomy or independent wealth.

*Item Labels:*

Letter from Harriet W. Bigelow to Edwin B. Frost, April 27, 1916  
*Yerkes Observatory, Office of the Director Records*

Letter from Caroline E. Furness to Edwin B. Frost, March 12, 1915  
*Yerkes Observatory, Office of the Director Records*

Furness frequently wrote to Frost to recommend exceptional Vassar graduates for positions at Yerkes. The letter shown here stands out for its directness. By 1915, the two had been corresponding for over a decade and had established a close working relationship. Furness felt comfortable assuming that Frost would accept her student without hesitation, especially when that student had secured an external fellowship and did not require Yerkes funding.

Letter from Vera M. Gushee to Edwin B. Frost, May 17, 1916  
*Yerkes Observatory, Office of the Director Records*

Vera Gushee was a student at Smith College. She wanted to pursue an MA at Chicago but, as this letter reveals, she could do so only if she received a scholarship. It was important to her that she be financially self-sufficient because, like the majority of the Yerkes women, she did not come from a wealthy family and had to be able to earn a living.

Letter from Edwin B. Frost to Evelyn W. Wickham, May 22, 1916  
*Yerkes Observatory, Office of the Director Records*

Evelyn W. Wickham graduated from Vassar College in 1916 and was one of Furness’ students. Both Wickham and her colleague, Vera Gushee, worked half-time as calculators in the observatory and spent the rest of their time doing work for their MA degrees.

Letter from Edwin B. Frost to Caroline E. Furness, April 17, 1916  
*Yerkes Observatory, Office of the Director Records*

Letter from Mary Murray Hopkins to Edwin B. Frost, April 17, 1916  
*Yerkes Observatory, Office of the Director Records*

Letter from Caroline E. Furness to Edwin B. Frost, April 24, 1916  
*Yerkes Observatory, Office of the Director Records*

## Independent Researchers

While it was common for male astronomers to spend time at observatories while pursuing their own research interests, the same courtesy was rarely extended to women. Yerkes, however, provided women, such as Allie V. Douglas, Frances Lowater, Julia M. Hawkes, and Alice H. Farnsworth, with the opportunity to do astronomical and astrophysical work either for their own edification, as in the case of Hawkes, or as visiting graduate students (Douglas) and researchers (Lowater, Farnsworth). For all four, Yerkes was a space in which they could conduct scientific work when not at their respective universities.

*Item Labels:*

Guestbook, 1897–1951  
*Yerkes Observatory Vault Records*

Edwin B. Frost and Frances Lowater  
“Spectrographic Observations of Mira Ceti, R Leonis, T Cephei, and R Serpentis”  
*The Astrophysical Journal*, Vol. LVIII, No. 5, December 1923

Letter from A. Vibert Douglas to Edwin B. Frost, April 3, 1928  
*Yerkes Observatory, Office of the Director Records*

Letter from Julia M. Hawkes to Edwin B. Frost, September 20, 1915  
*Yerkes Observatory, Office of the Director Records*

Letter from Edwin B. Frost to A. Vilbert Douglas, November 4, 1927  
*Yerkes Observatory, Office of the Director Records*

Letter from Edwin B. Frost to A.S. Eve, September 30, 1925  
*Yerkes Observatory, Office of the Director Records*

## Ando Case

*Item Labels:*

Spectrum Measurement Tool, n.d.  
*University of Chicago*

The measurement of stellar spectra is important for determining the composition and velocity of stars. This tool allows for close comparison of three spectra, photographed on a glass plate. The central row is the spectrum of a distant star, while the outer rows are the spectra of iron in the lab for reference. By comparing the middle spectrum with the reference spectra, scientists can identify characteristic lines which indicate the presence of particular elements in the star’s atmosphere as well as a shift in the location of these lines, indicative of the star’s movement toward or away from Earth.

### **Daniel Babnigg**

Telescope, constructed according to instructions written by Vera M. Gushee (1916)  
*University of Chicago*



**Vera M. Gushee**

*A Study of the Proper Motions in the Cluster N.G.C. 663*

Chicago: s.l., 1917

QB1099.G9 Gen

Kenwood telescope eyepiece, n.d.

*On loan from Yerkes Observatory, Williams Bay, Wisconsin, courtesy of the Yerkes Future Foundation*

Kenwood telescope objective lens, n.d.

*University of Chicago*

This lens and eyepiece to the right are from the telescope that Mary Calvert used in the image above.

Millionaire Calculating Engine

*On loan from Lowell Observatory, Flagstaff, AZ*

This is one of the earliest motorized calculating machines, an essential piece of equipment for observatory staff.

Glass plate, n.d.

Plate 13, No. 177

*University of Chicago*

Chart 13, Region of the Great Nebula of Rho Ophiuchi [reproduction]

*A Photographic Atlas of Selected Regions of the Milky Way*

Washington, DC: Carnegie Institution of Washington, 1927

**Edward Emerson Barnard**

*A Photographic Atlas of Selected Regions of the Milky Way*

Washington, DC: Carnegie Institution of Washington, 1927

QB819.B28 c.5 Rare

E. E. Barnard (1857–1923) was a pioneer in astronomical photography. His earliest work used lenses designed for portraiture to obtain increasingly detailed images of faint objects. By the early twentieth century, advances in photographic plate technology made it possible to undertake a systematic photographic survey of the Milky Way.

The atlas contains exceptionally high-quality images of the Milky Way as a general resource for astronomical research. The first volume contains the photographs. The second volume provides extensive documentation for each of the forty-nine fields, including information about the stars, star clusters, and dark nebulae visible within each field. The undertaking proved so demanding that it was published only in 1927, after Barnard's death, brought to completion by Mary Ross Calvert.

Displayed here is a field surrounding the star Rho Ophiuchi, showing both bright and dark nebulosity and its original glass plate.

**Harriet M. Parsons**

*The Photo-Visual Magnitudes of the Stars in the Pleiades*

Chicago: s.l., 1916

QB1099.P3 Gen

In her dissertation, Harriet Parsons described how she obtained visual magnitudes of stars in the Pleiades through photography, performed calibration calculations, and determined both their relative and absolute magnitudes. She also compared her results to data from reference catalogs to see how effective her methods were. After obtaining her PhD she went on to become an instructor at Smith College.

Letter from Ardis T. Monk to Edwin B. Frost, October 12, 1915

*Yerkes Observatory, Office of the Director Records*

Ardis Thomas graduated from the University of Chicago in 1913. Two years later, as Mrs. Ardis T. Monk, she wrote to director Frost to inquire about a position at the Observatory. Married women typically did not work at observatories in the early twentieth century. But Frost responded affirmatively, saying not only that he would be able to hire her as a computer but also, “it occurs to me that you might wish to be enrolled as a graduate student.”

Letter from Edwin B. Frost to Harriet M. Parsons, May 7, 1915

*Yerkes Observatory, Office of the Director Records*

Letter from Walter S. Adams to Edwin B. Frost, October 21, 1917

*Yerkes Observatory, Office of the Director Records*

Letter from Theodore S. Jacobsen to Edwin B. Frost, November 20, 1922

*Yerkes Observatory, Office of the Director Records*

Theodore S. Jacobsen wrote this letter to ask whether a position might be available at Yerkes Observatory in the future. Most scholarship claims that computer positions in observatories during the early twentieth century were reserved for women, who were generally more willing to accept reduced pay. But, this letter reveals that men were also willing to work as computers.

Letter from Dorothy W. Block to Edwin B. Frost, June 19, 1919

*Yerkes Observatory, Office of the Director Records*

Letter from Edwin B. Frost to J.S. Dickerson, September 29, 1919

*Yerkes Observatory, Office of the Director Records*

### **Raquel Buriani**

Replica of a dress worn by Vera Gushee, 2023

Photograph of Vera Gushee, 1916 [reproduction]

## Life After Yerkes

Social and cultural conventions in early-twentieth-century America dictated that an academic career—among other forms of employment—was incompatible with marriage and raising a family. Yet many of the women of Yerkes did go on to have careers as university professors, schoolteachers, real estate agents, managers, and business owners, to name only a few. Many of the Yerkes women stayed involved with astronomy for many years after leaving the observatory, even as they worked in other

professions or left the workforce. Throughout their lives, Yerkes was and remained a place about which they had fond memories.

*Item Labels:*

Inez Wendell Alfors  
*My Yesterday Your Today Cookbook*  
Winston-Salem, N.C.: Piedmont Bible College Press, 1973  
TX715.A44 1977 c.1 ArcMon

Inez Wendell was the daughter of Yerkes Observatory janitor Carl Wendell. She went on to a career in food service management and eventually wrote this cookbook. Note her recollection of working as a computer.

Postcard from Emily E. Dobbins to Edwin B. Frost, September 1, 1910

*Yerkes Observatory, Office of the Director Records*

Anne Sewell Young and Emily Elisabeth Dobbin met at Yerkes Observatory in the early 20th century. In 1910, when Young was a professor at Mt. Holyoke College and Dobbin was becoming more active as a suffragette, the two friends visited the Paris Observatory together. It was the “11th Observatory” on their European tour.

Letter from Jessie A. Short to John A. Parkhurst, November 19, 1920

*Yerkes Observatory, Office of the Director Records*

Letter from Bertha Hirt to Edwin B. Frost, October 11, 1929

*Yerkes Observatory, Office of the Director Records*

Letter from Edwin B. Frost to Miss Marion McCracken, May 23, 1919

*Yerkes Observatory, Office of the Director Records*

Evelyn Wornham Wickham retained her job in the engineering lab of AT&T after her marriage in 1925. She only left the workforce after the birth of her first child in 1927.

Letter from Harriet M. Parsons to Edwin B. Frost, August 27, 1921

*Yerkes Observatory, Office of the Director Records*

Letter from Edwin B. Frost to Harriet M. Parsons, June 2, 1923

*Edwin B. Frost Papers*

Congratulating Yerkes astronomer Harriet McWilliams Parsons on her upcoming marriage, Frost filled this letter with astronomical allusions as well as genuine warmth. Despite the cheer, both Frost and Parsons knew that marriage was often the end of a woman astronomer’s career. However, Harriet Parsons-Hall stayed involved in astronomy. After leaving Yerkes and Smith, she continued attending conferences, giving lectures, and keeping time for an eclipse observation while pregnant with her first daughter in 1925.

Letter from Alice H. Farnsworth to Edwin B. Frost, February 5, 1928

*Yerkes Observatory, Office of the Director Records*

Letter from Emily E. Dobbins to George E. Hale, May 23, 1903

*Yerkes Observatory, Office of the Director Records*

## Science Communication

Astronomy was a popular science topic for the public in the early twentieth century. Scientific communication and outreach were an important part of the Yerkes Observatory mission from its beginning. The staff of Yerkes, including the women, provided tours to hundreds of visitors each year. Public lectures were held in various places by the Yerkes astronomers, including during expeditions to observe solar eclipses. Lantern slides for educational use and public lectures were produced for sale and advertised in catalogs. Sometimes these lantern slides were hand-colored by women on the staff of the Observatory. Journalists like Mary Proctor, daughter of British popularizer of astronomy, Richard Proctor, wrote articles for newspapers and magazines about discoveries of the day and published books for general and younger readers on astronomy.

### *Item Labels*

#### **Mary Proctor**

*Half-Hours with the Summer Stars*

Chicago: A.C. McClurg & Co., 1911

523.8 R100 Gen

#### **Mary Proctor**

*Legends of the Stars*

London: George G. Harrap & Co. Ltd., 1922

QB55.P9 Gen

#### **Mary Proctor and A.C.D. Crommelin**

*Comets: Their Nature, Origin and Place in the Science of Astronomy*

London: The Technical Press Ltd., 1937

QB721.P89 Gen

#### **Edwin B. Frost**

*Let's Look at the Stars*

New York: Houghton Mifflin Company, 1935

PZ236.A8F9 EB Children's Literature

Letter from Edwin B. Frost to Elizabeth Wight, February 25, 1925

*Yerkes Observatory, Office of the Director Records*

Letter from Emily E. Dobbins to Edwin B. Frost, December 12, 1908

*Yerkes Observatory, Office of the Director Records*

Letter to Edwin B. Frost, May 28, 1918

*Yerkes Observatory, Office of the Director Records*

Lecture flyer, May 10, 1918

*Yerkes Observatory, Office of the Director Records*

## A Century of Progress

### Focus Panel (150 words):

In 1933, the second Chicago-based World's Fair opened. The first had been in 1893, on what is now the University of Chicago campus. To connect the two events, the star Arcturus was chosen. Located approximately 40-light years away from Earth, light emitted in 1893 was now visible on Earth. Light from Arcturus was collected by the 40-inch refractor, converted into an electrical signal, and sent to Chicago, where—at the push of a button—the amplified electrical current illuminated the fair.

1933 was also the first full year with the Observatory under new leadership. Edwin B. Frost retired in 1932, and his departure marked the end of an era. The number of women working at Yerkes and the scope of their activities contracted after his departure. This was in no small part due to economic hardships caused by the Great Depression, which commenced with the stock market crash of 1929. But, with Frost's departure, the institution lost a leader who had made the Yerkes into an institution that was not just open to women, but one in which they were welcomed and able to thrive.

### Item Labels:

Letter from Edwin B. Frost to F.W. Barr, September 28, 1928

*Yerkes Observatory, Office of the Director Records*

Could a woman have a career in astronomy? One mother wrote to Frost, worried about her daughter's future prospects. Frost wrote to assuage her fears. She might not earn a lot of money—no astronomer did—but it was possible. Women *could* be astronomers.

G-34, Photoelectric Relay, 1933

*Courtesy of Adler Planetarium, Chicago, Illinois*

This photoelectric relay was manufactured in the machine shop at Yerkes Observatory. It converted the light from the star Arcturus—captured by the 40-inch telescope—into electricity, which travelled from Williams Bay to Chicago and illuminated the 1933 World's Fair.

### *Arcturus*

Chicago: Arcturus Radio Tube Co., n.d.

*Guide to the Century of Progress International Exposition Publications 1933-1934*

MS 226 v. 14

Newsreel footage, 1920

*Courtesy of the UCLA Film & Television Archive*

Newsreels were commonly shown prior to a feature film in a cinema in the pre-television news era. The footage seen here are surviving fragments of newsreels filmed at the Yerkes Observatory by the Hearst International News Company. These scenes focus on members of the Yerkes community at the Observatory.

Newsreel footage, 1930

*Courtesy of the Sherman Grinberg Film Library*

Newsreels were common in the pre-television news era. The newsreel was typically shown prior to a feature film in a cinema. The footage seen here, filmed at the Yerkes Observatory by the Pathé News Company, features the observatory's 40-inch refractor and shows the telescope's transformation from an instrument used for observing into a giant camera.

Russell Heibel

*What Are Spectra?*

Russell Heibel

*The Progress of Astronomical Imaging: From Yerkes Observatory to the James Webb Telescope*