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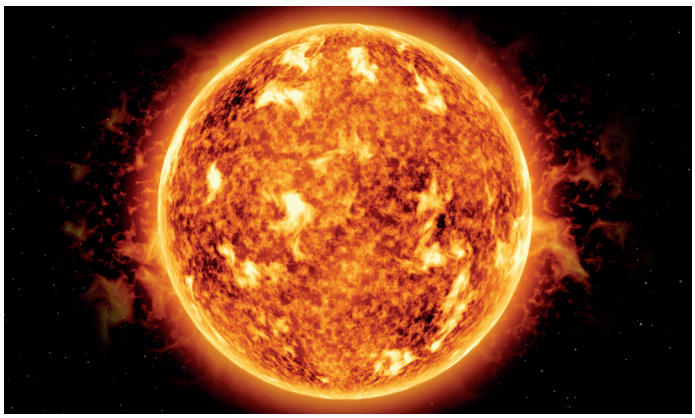
A truly stellar legacy

Cecilia Payne-Gaposchkin cracked the chemistry of stars a century ago. Her moment in the sun is finally here, finds **Donna Lu**



THOMAS FAULL/GETTY IMAGES

Book

What Stars Are Made Of: The life of Cecilia Payne-Gaposchkin
Donovan Moore
Harvard University Press

ONE of the lesser known consequences of the current wave of feminism is the number of women that have been added to the scientific and technological canon.

Cecilia Payne-Gaposchkin is the latest. *What Stars Are Made Of,* a biography by Donovan Moore, highlights the British astronomer and astrophysicist's contribution in overturning a basic assumption about the make-up of the universe.

In the 1920s, Payne-Gaposchkin analysed the spectral pattern of stars, a plot of the amount of light given off at different wavelengths. Because this pattern varies depending on which elements a star contains, this allowed her to show that these objects are comprised primarily of hydrogen – making this the most abundant substance in the universe. She found that there was about a million times more hydrogen in stars than we thought.

However, the prevailing belief was that the elemental make-up of stars was like Earth's, and Payne-Gaposchkin's discovery was rejected. Henry Norris Russell, director of Princeton University's observatory, dismissed her finding as "clearly impossible". Just four years later, his research confirmed her work – yet he got the credit for the discovery.

Payne-Gaposchkin's life showed an early leaning towards science. Born in 1900 in the UK, she once wrote that she felt her life as a scientist began at the age of 8, recognising a species of orchid in her mother's garden. Moore adds an amusing aside: "She recounted later that she learned about sex not from ever-proper Emma [her mother], but rather by working it out herself as she studied the pollination of tropical cycads."

At the University of Cambridge, Payne-Gaposchkin took physics and chemistry, working at the Cavendish Laboratory, then headed by nuclear physicist Ernest Rutherford. She finished her studies, but didn't receive a degree: women at Cambridge weren't granted degrees until the late 1940s.

Despite that, she moved to the US to study, where her groundbreaking thesis on the composition of stars in 1925 made her the first person to earn a PhD in astronomy from Harvard University's Radcliffe College. Later, she would become the first woman to be appointed to a full professorship at Harvard.

As a young woman, she was driven by research. "Once I worked for 72 hours straight without sleep," Payne-Gaposchkin wrote. That didn't stop her having other interests, from music to politics and cooking to soap-making.

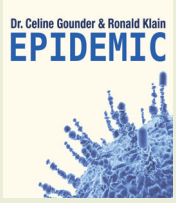
What Stars Are Made Of is minutely researched – at one point, Moore even retraces Payne-Gaposchkin's bicycle journey from Newnham College in Cambridge to the university's observatory. The result is a rich and illuminating biography of a scientist whose contributions have been underappreciated for too long.

Some recognition came in 1976, when Payne-Gaposchkin received an American Astronomical Society lifetime award, named, ironically, the Henry Norris Russell Lectureship. In her acceptance speech she said: "The reward of the young scientist is the emotional thrill of being the first person in the history of the world to see something or understand something. Nothing can compare with that experience... The reward of the old scientist is the sense of having seen a vague sketch grow into a masterly landscape." ■

SCIENCE HISTORY IMAGES/ALAMY

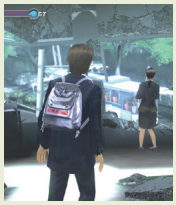
Cecilia Payne-Gaposchkin found that the universe was full of hydrogen

Don't miss



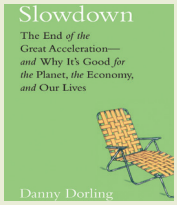
Listen

Epidemic is a weekly podcast hosted by Celine Gounder and Ronald Klain that offers a US angle on covid-19. The well-researched show draws on history, politics, economics and anthropology to make sense of the pandemic.



Play

Disaster Report 4: Summer memories, released worldwide on 7 April, casts you as a struggling survivor in an earthquake-torn city. In this game, the smallest actions ripple into life-changing events in the fight to stay alive and ultimately escape.



Read

Slowdown (Yale University Press) by social geographer and author Danny Dorling finds that human progress and growth have been slowing down since the early 1970s – and argues that this is a good thing for the planet.

YALE UNIVSERITY PRESS; GRANZELLA INC