



# *Margaret Huggins*

## (1848-1915)

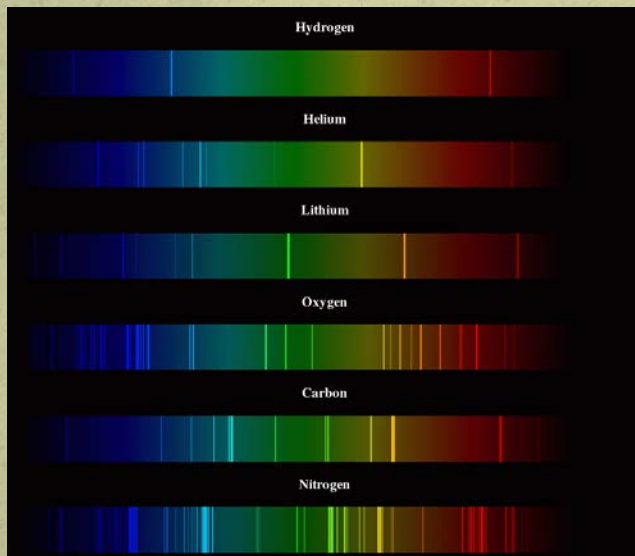


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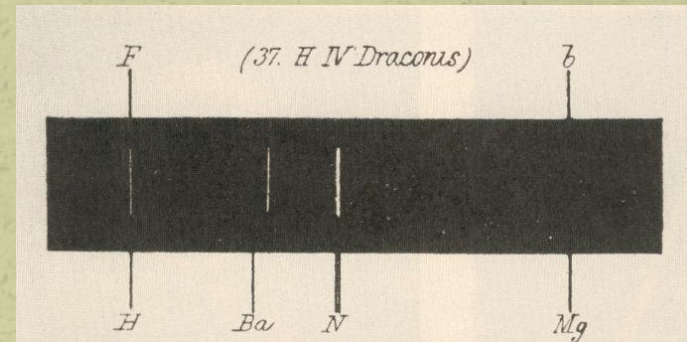
Irish scientific investigator and astronomer

With her husband William Huggins she was a pioneer in the field of celestial spectroscopy.

Born in Ireland, Margaret Huggins got her love of astronomy from her grandfather. He taught her the constellations, and as a result of this she began studying the heavens with home-made instruments. She even made a spectroscope which she used to observe spectral lines in the Sun. She also learned photography, which was an important new technology in astronomy.

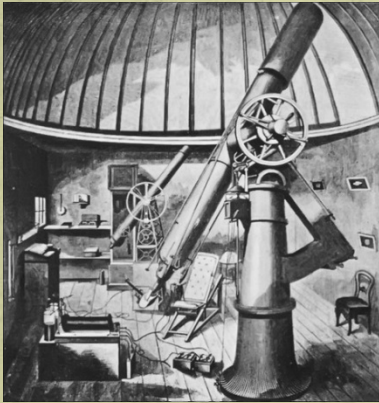


Emission Line Spectra for Important Chemical Elements found in the Universe



Spectra of the light of nebulae – William Huggins concluded that at least some nebulae were gaseous in nature, not stars

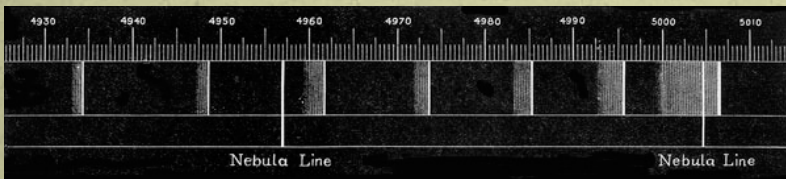
Her interest on the exciting new field of astronomical spectroscopy which was being pioneered by William Huggins led to her introduction to the astronomer. Eventually, the two astronomers married in 1875.



Despite the disparity of their ages (he was 51 and she was 27) they enjoyed a happy marriage and a fruitful research collaboration. Margaret brought photographic and organizational skills to the partnership and they both worked very hard in their observatory home at Tulse Hill.

William and Margaret Huggins were the first to identify the lines in the spectrum of a star other than the Sun; they also took the first spectrogram, or photograph of a stellar.

They showed that the same chemical elements found in the Sun and planets exist in the stars. They analyzed the spectra of planets, stars, nebulae, and even radioactive substances.



The Huggins' illustration comparing the visible magnesium spectrum with that of a nebula (1882) – (hand-drawn)

1880

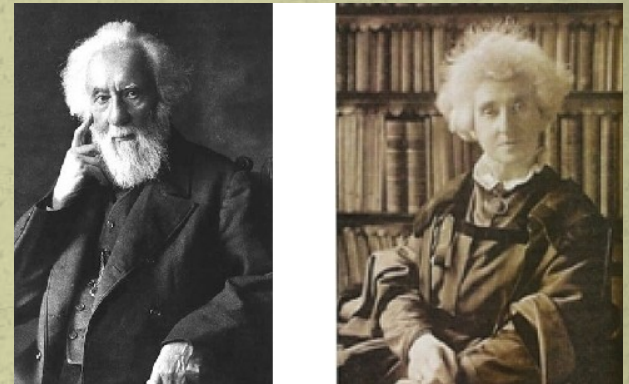
January 2<sup>d</sup> It is delightful to begin the year with work. About 9 p.m. the sky was beautifully clear and we determined to try if we could secure any photograph however slight of the spectrum of the nebula in Orion. We gave about 1 hour's exposure and then put the apparatus on Sirius for 10 minutes to get a comparison spectrum. Developed at once with great care. But no image whatsoever of the nebula. This was very disappointing. Our inferior mirror is against us: but if we can succeed in getting much more sensitive plates we might perhaps succeed in spite of the mirror. Must stir up the plate maker. The spectrum of Sirius beautiful, and in this photograph one sees clearly the line  $H_2$  (or K) faint and thin, but without winged, and rather differing in character from this line in some of the other stars where it is faint and thin too.

Margaret Huggins' notebook page  
from 2 January 1880

In 1868, they discovered that the spectral lines of the star Sirius are shifted slightly to the red end of the spectrum, which was recognized as an indication that Sirius is moving away from us.

This method, called the Doppler shift, would be used to learn the true nature of faint clouds called “nebulae,” and eventually lead to the discovery of the expanding universe in the 20th century.

The couple won the Actonian Prize after publishing their research (1899), ‘An Atlas of Representative Stellar Spectra’.



William and Margaret Huggins are acknowledged as founders of the science of astrophysics.

William died of heart failure in 1910 and Margaret died in 1915.

## References:

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The Orion Nebula (M42)

This presentation was created by students taking part in the programme  
"Four Seasons in the Sky"

