Margaret Huggins (1848-1915)

Margaret Lindsay, Lady Huggins, born Margaret Lindsay Murray, was an 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.

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. It was Margaret Lindsay Murray who introduced photography as an integral and necessary element of their 35 years of devotion to each other and to their work.

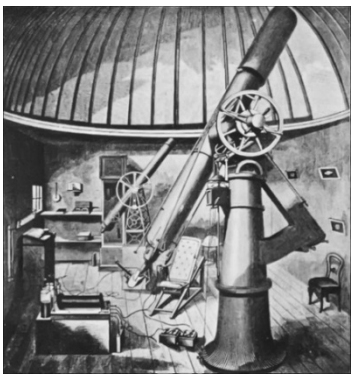


Figure 1. Tulse Hill, London (1856)

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 spectrum.

They succeeded in identifying some of the lines in stellar spectra as those of known elements on Earth, showing 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.

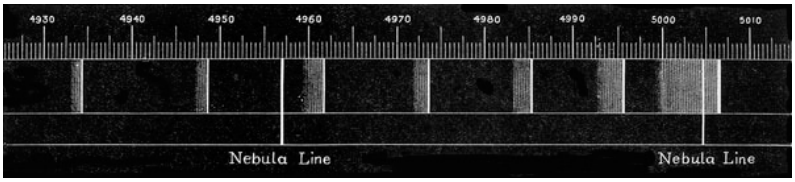


Figure 2. The Huggins' illustration comparing the visible magnesium spectrum with that of a nebula (1882) – (hand-drown)

In 1868, they discovered that the spectral lines of the star Sirius are shifted slightly to the red end of the spectrum, which William recognized as an indication that Sirius is moving away from us, and he even measured its speed of recession.

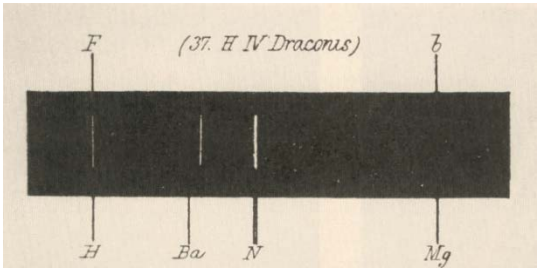
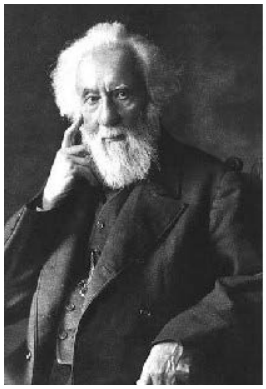


Figure 3. Spectra of the light of nebulae – William Huggins concluded that at least some nebulae were gaseous in nature, not stars.

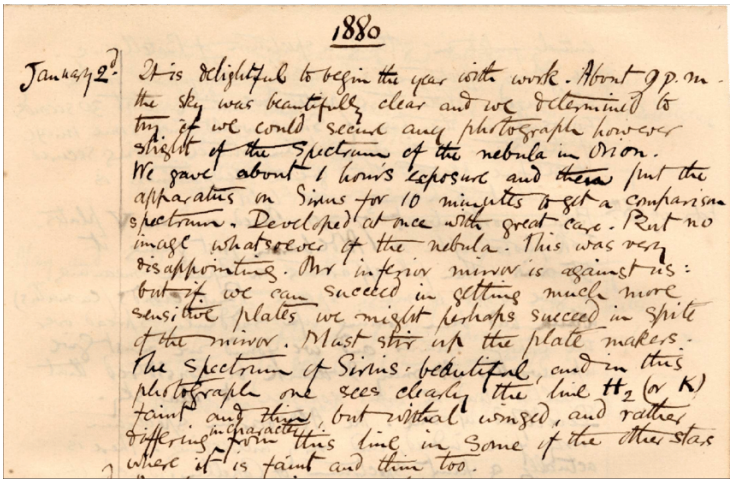
They measured other stars as well and found that a few exhibited a shift in spectral lines towards the blue side of the spectrum, indicating they were traveling towards Earth.

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

The couple won the Actonian Prize of the Royal Institution for science writing after publishing their research, '*An Atlas of Representative Stellar Spectra*' (1899).



William and Margaret Huggins are acknowledged as founders of the science of astrophysics. In 1897, at Queen Victoria's Diamond Jubilee, William was created a Knight Commander of the Order of the Bath and Margaret was included in the citation. William died of heart failure in 1910 and Margaret died in 1915.



1880

January 2d. 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. Mr 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 makers. The spectrum of Sirius beautiful, and in this photograph one sees clearly the line H_2 (or K) faint and thin, but withal winged, and rather differing in character from this line in some of the other stars where it is faint and thin too.

Figure 4. Margaret Huggins' notebook page from 2 January 1880