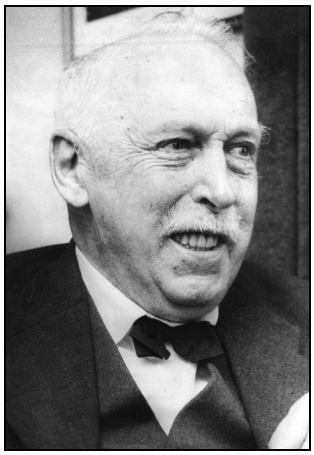
Ejnar Hertzsprung



Hertzsprung was born on the 8th of October 1873 in Frederiksberg, Denmark. His father had obtained a degree in astronomy in the local university. Although awarded a gold medal for some of his work in astronomy, his father gave up science due to the poor financial returns involved and eventually became director of the Denmark's national life insurance company.

In 1893, when Ejnar was 20 years old, his father died. After this, his father's books were sold as there was nobody in the family, including Ejnar, who had an interest in astronomy. His father never wanted his son to study astronomy or insurance or mathematics. As a result, Ejnar himself went to university and graduated with a degree in chemical engineering and never studied astronomy.

Between 1899 and 1901, Ejnar was employed as an engineer at St. Petersburg and studied photochemistry at Leipzig. In 1902, Hertzsprung returned to Denmark after the death of his mother and started working as an amateur astronomer at the Copenhagen University Observatory and the Urania Observatory in Frederiksberg, which belonged to a well-known amateur astronomer Victor Neilsen. Victor is quoted as saying to a fellow amateur; "Hertzsprung is a clever young man who intends to measure star colours photographically". Little did they know that this was to start a life-long interest in stellar measurement and lead to ground-breaking research in stellar physics.

In 1905 Hertzsprung published "Zur Strahlung der Sterne" (Radiation of Stars) in the periodical "Zeitschrift für Wissenschaftliche Photographie" (Magazine for Scientific Photography). What was unusual about this was that he did not publish them in an astronomical journal. This paper made the following conclusions:

- Stars in the spectral-classes G, K and M are divided into two series with different luminosity.
- Luminous red stars must be massive.
- The small number of red giants indicates that that these stars are in a stage of fast evolution.
- A connection existed between the spectrum and the luminosity of stars.

In 1907 Hertzsprung published "Zur Bestimmung der Photographischen Sterngrössen" (Determination of the Photographic Star Sizes) in the same journal with his follow-on results.

Karl Schwartzchild was the leading astronomer in Germany at the time and was the director of Göttingen Observatory. Upon reading Hertzsprung's papers he secured a post for him firstly at Göttingen Observatory and later took him to Potsdam, where Schwartzchild also moved. Within seven months, Hertzsprung become a senior staff member at one of Europe's premier observatories.

Meanwhile, across the Atlantic and one year later, Henry Norris Russell came to conclusions very similar to those determined by Hertzsprung but was completely unaware of the Danish man's work, partly due to the unusual nature of the publication of Hertzsprung's work.

The graphical form of both Hertzsprung's and Russell's' work wasn't published until 1911 by Hertzsprung in the paper "Publikationen des Astrophysikalischen Observatorium zu Potsdam" (Astrophysical Publications of Potsdam Observatory).

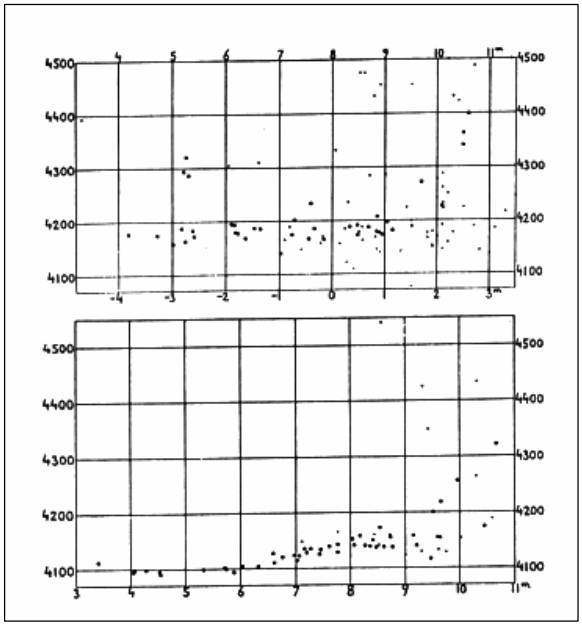


Figure 1 – Charts from Hertzsprung's Paper of 1911

As time when on, this chart became more developed and can often be found in more graphically-edited forms such as that shown below:

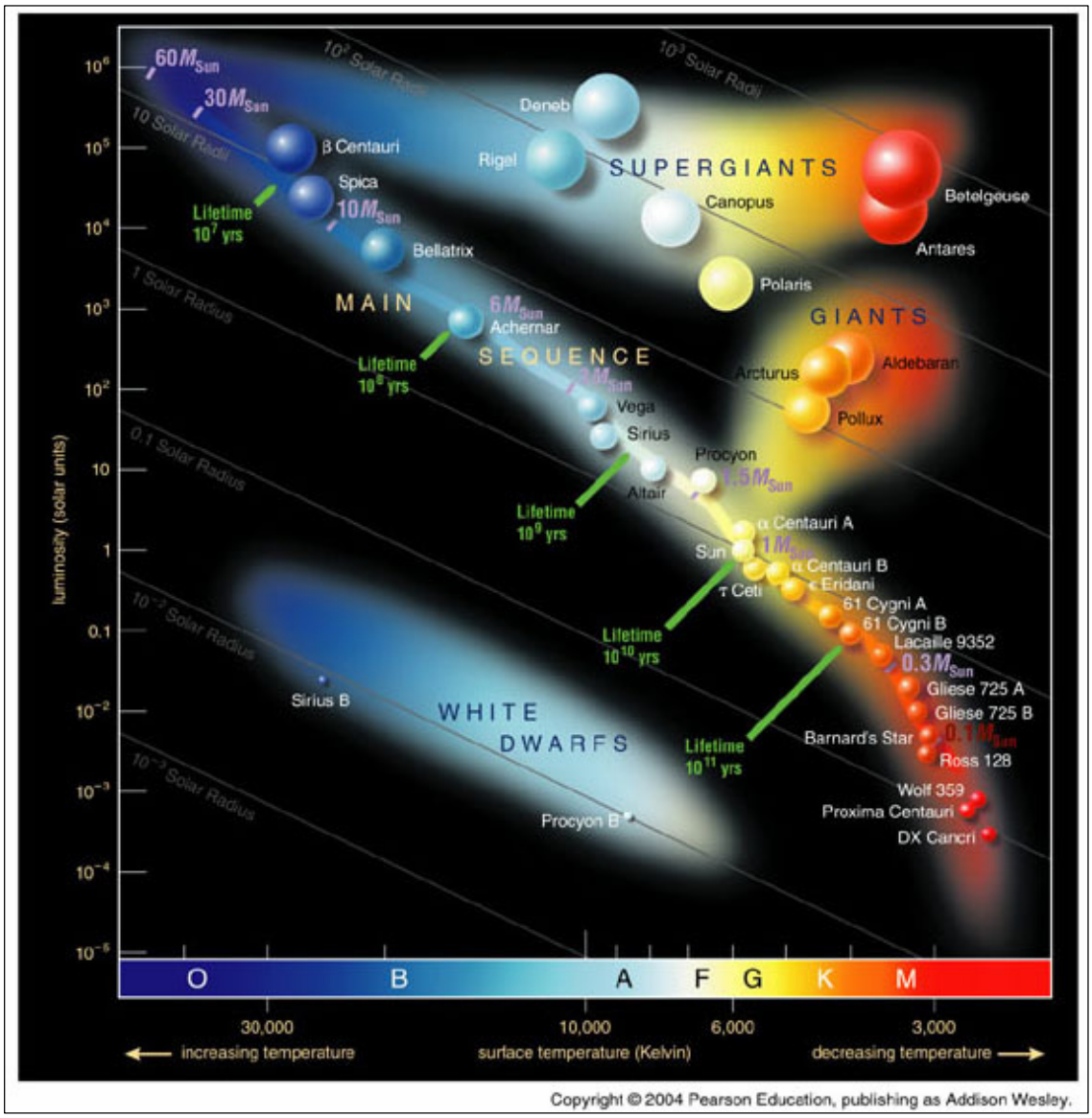


Figure 2 – Hertzsprung-Russell Diagram

Both astronomers became attributed to this common piece of work. However, there was no animosity between the two gentlemen. Russell, when asked about the diagram, was quick to point out that it was Hertzsprung who started work on developing it. Hertzsprung, for his part, is quoted as saying “It is Russell’s merit that he presented this complex of problems in a spirited, easily understood form in current journals”.

In 1919, Hertzsprung became Adjunct Director of the University Observatory of Leiden, Holland and was promoted to rank of associate professor in 1920.

In 1922, Hertzsprung published his catalogue of data representing 734 stars, all of which were brighter than 5th magnitude. At the time, accurate information was not available on star parallax so he used data from stars' proper motion to calculate absolute magnitude and thence construct a diagram showing a relationship between colour and luminosity.

However, Hertzsprung also undertook research in others areas of stellar measurement. In 1911 he developed a light curve for Polaris. Shortly after, he determined the distance of the Small Magellanic Cloud using Cepheid variable stars. In 1926, he undertook further work on Cepheid variable stars and developed a relationship between period length and light curve shape based on photographs he took at an observatory in South Africa during an 18-month trip there in 1923-1925.

However, he undertook extensive work in the measurement of double stars. He developed techniques which would allow him to measure relative positions between stars to an accuracy of a few thousandths of an arc second.

During his work, he also discovered two asteroids; 1627 Ivar in the year 1929 and the asteroid 1702 Kalahari 5 years earlier.

During his time, Hertzsprung received many awards, including doctorates from the universities of Utrecht (1923), Copenhagen (1946) and Paris (1949). He also received the Gold Medal from the Royal Astronomical Society in 1929 and the Bruce Medal in 1937 from the Astronomical Society of the Pacific. In 1959, the city of Copenhagen gave him it's Ole Roemer Medal.

Hertzsprung continued to take measurements long after his retirement and only slowed down 2 to 3 years before his death. He is quoted as saying "I cannot compete with Dr. Strand any longer!"; Dr. Strand being a former student of his who was Director of the US Naval Observatory.

Hertzsprung died in 1967 in Roskilde, Denmark, at the age of 94 and his papers (12,153 pages with original measurements) were given to the USNO Library.