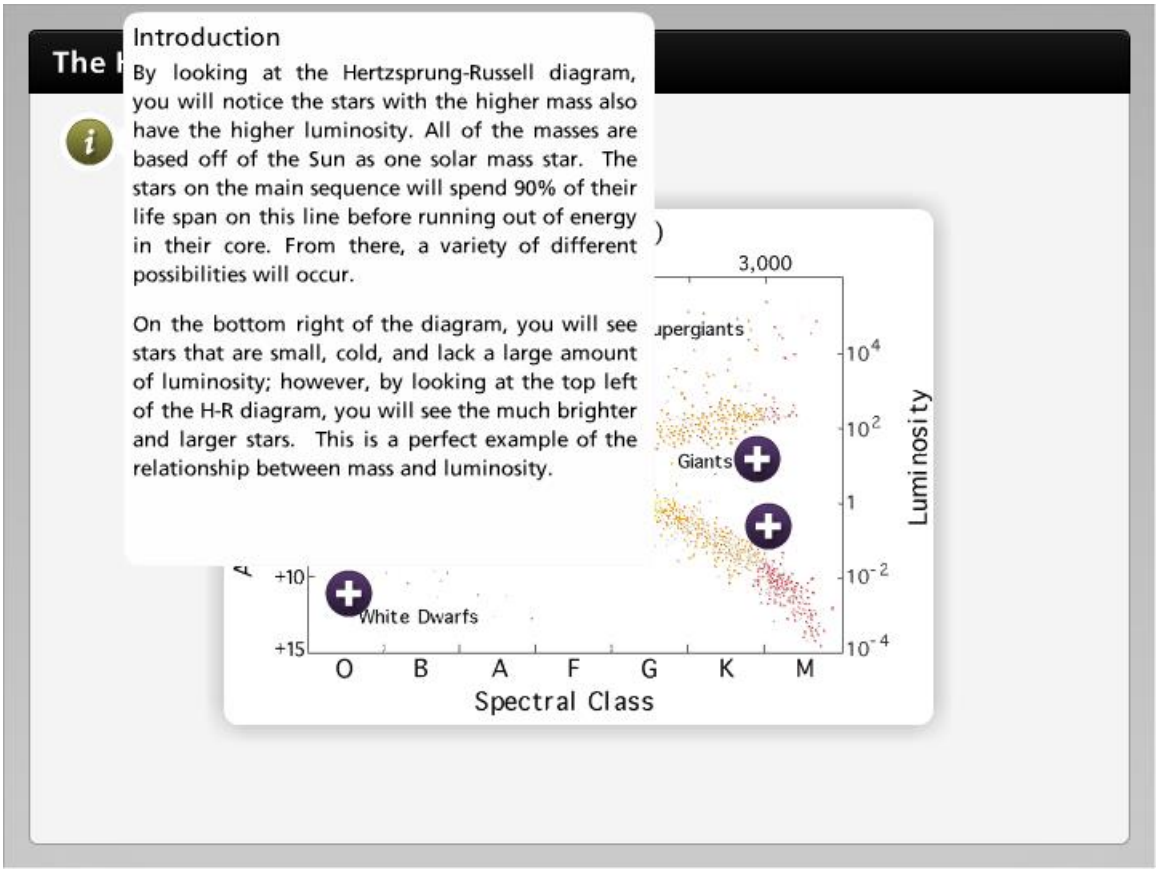
Module 7: Stars
Topic 2 Content: The Hertzsprung-Russell (H-R) Diagram Notes

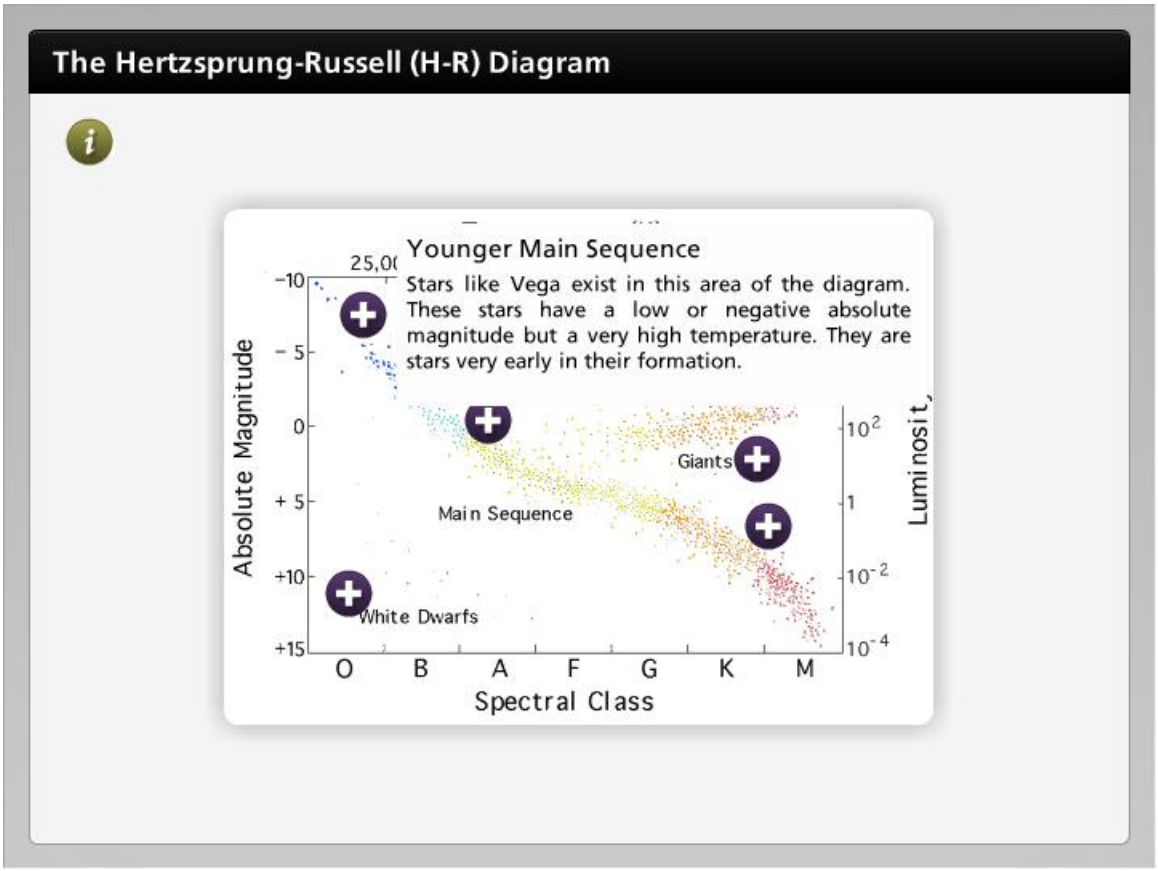
Introduction



By looking at the Hertzsprung-Russell diagram, you will notice the stars with the higher mass also have the higher luminosity. All of the masses are based off of the Sun as one solar mass star. The stars on the main sequence will spend 90% of their life span on this line before running out of energy in their core. From there, a variety of different possibilities will occur.

On the bottom right of the diagram, you will see stars that are small, cold, and lack a large amount of luminosity; however, by looking at the top left of the H-R diagram, you will see the much brighter and larger stars. This is a perfect example of the relationship between mass and luminosity.

Younger Main Sequence



Stars like Vega exist in this area of the diagram. These stars have a low or negative absolute magnitude but a very high temperature. They are stars very early in their formation.

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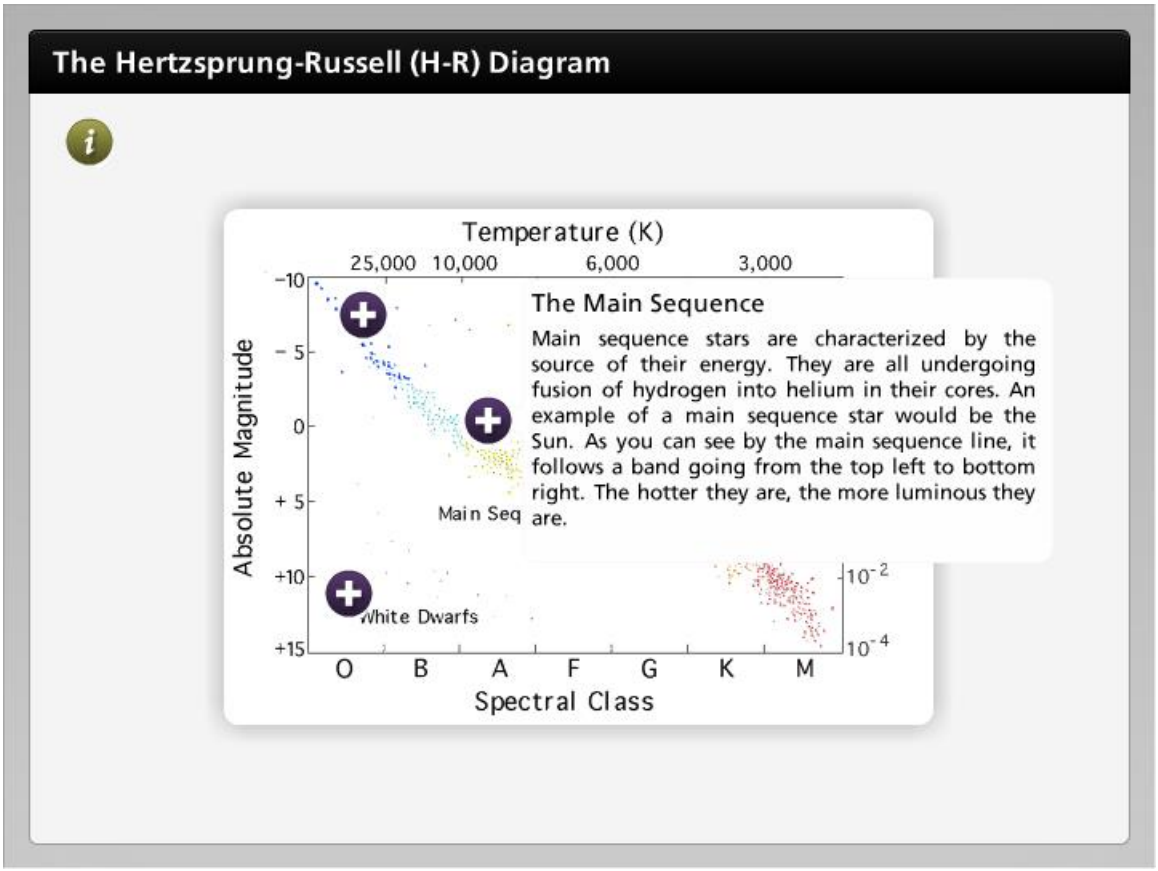
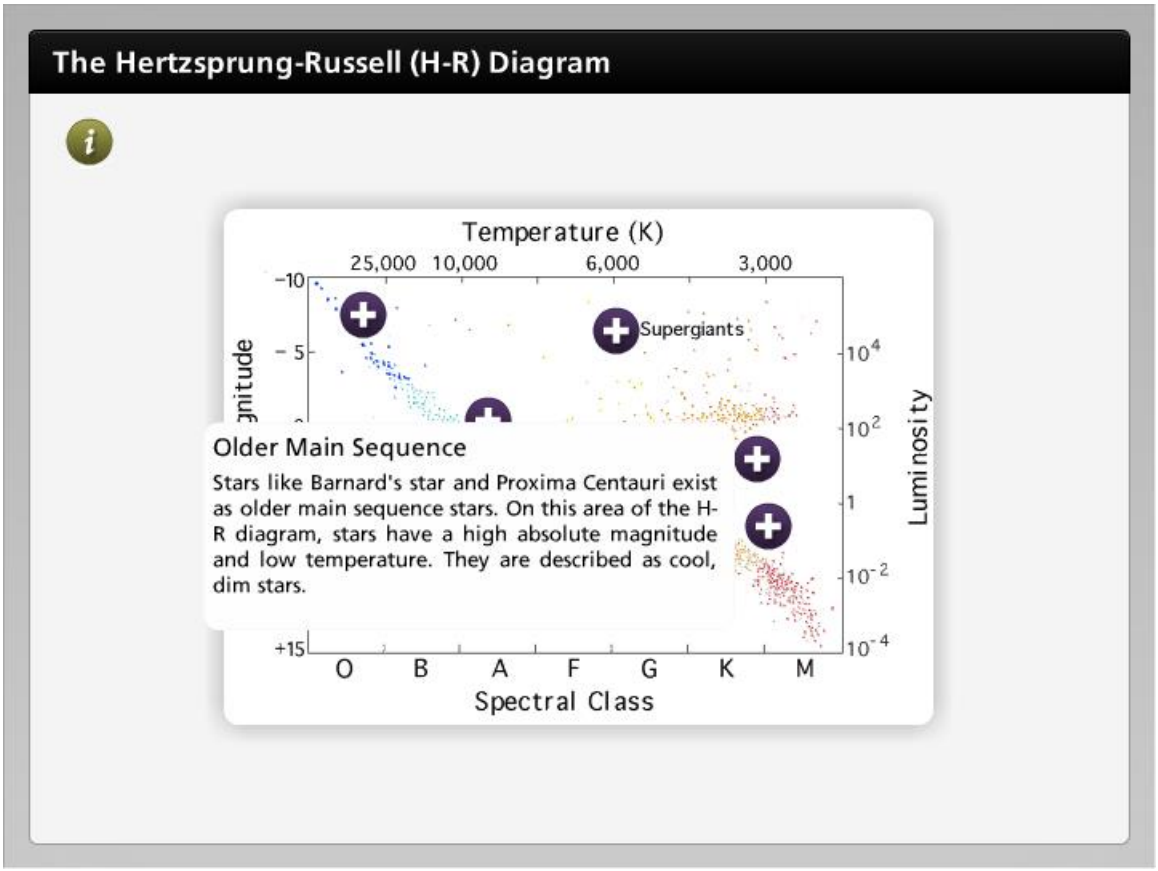
The Main Sequence



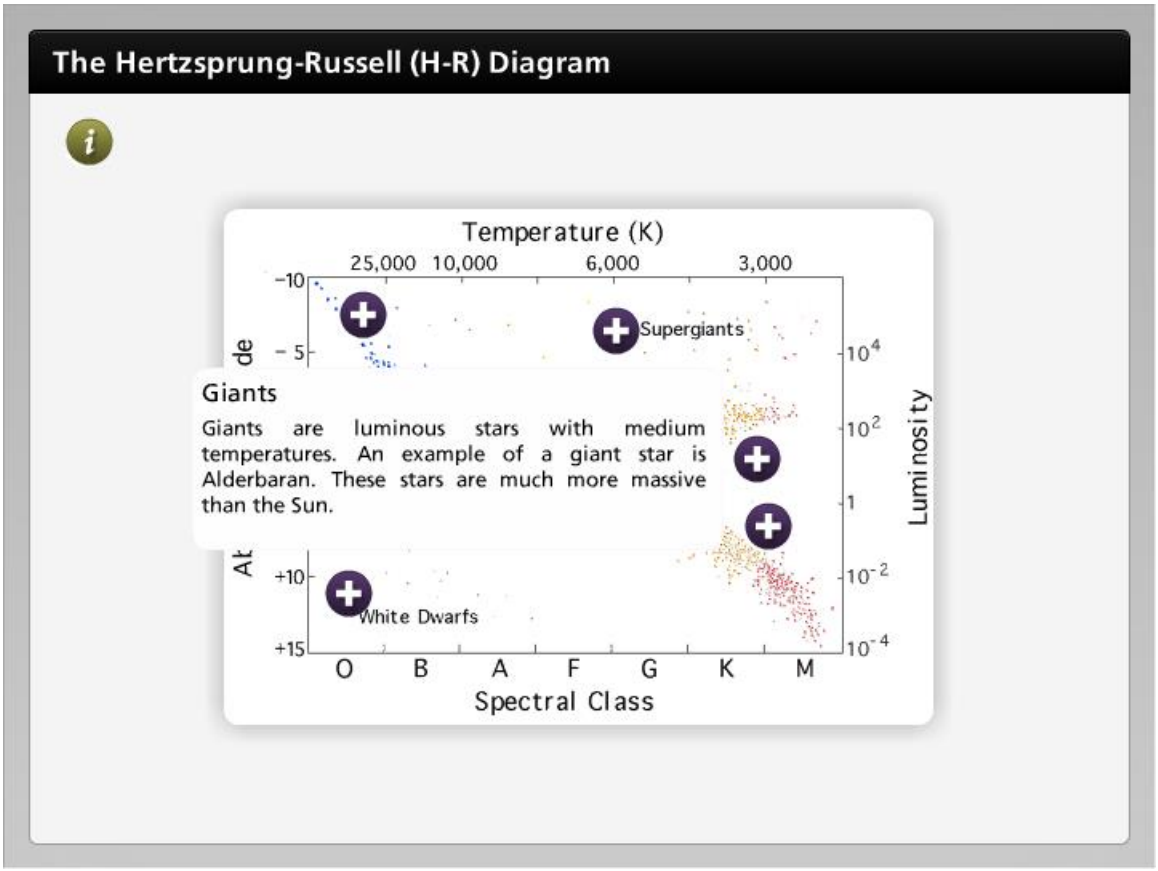
Main sequence stars are characterized by the source of their energy. They are all undergoing fusion of hydrogen into helium in their cores. An example of a main sequence star would be the Sun. As you can see by the main sequence line, it follows a band going from the top left to bottom right. The hotter they are, the more luminous they are.

Older Main Sequence



Stars like Barnard's star and Proxima Centauri exist as older main sequence stars. On this area of the H-R diagram, stars have a high absolute magnitude and low temperature. They are described as cool, dim stars.

Giants



Giants are luminous stars with medium temperatures. An example of a giant star is Alderbaran. These stars are much more massive than the Sun.

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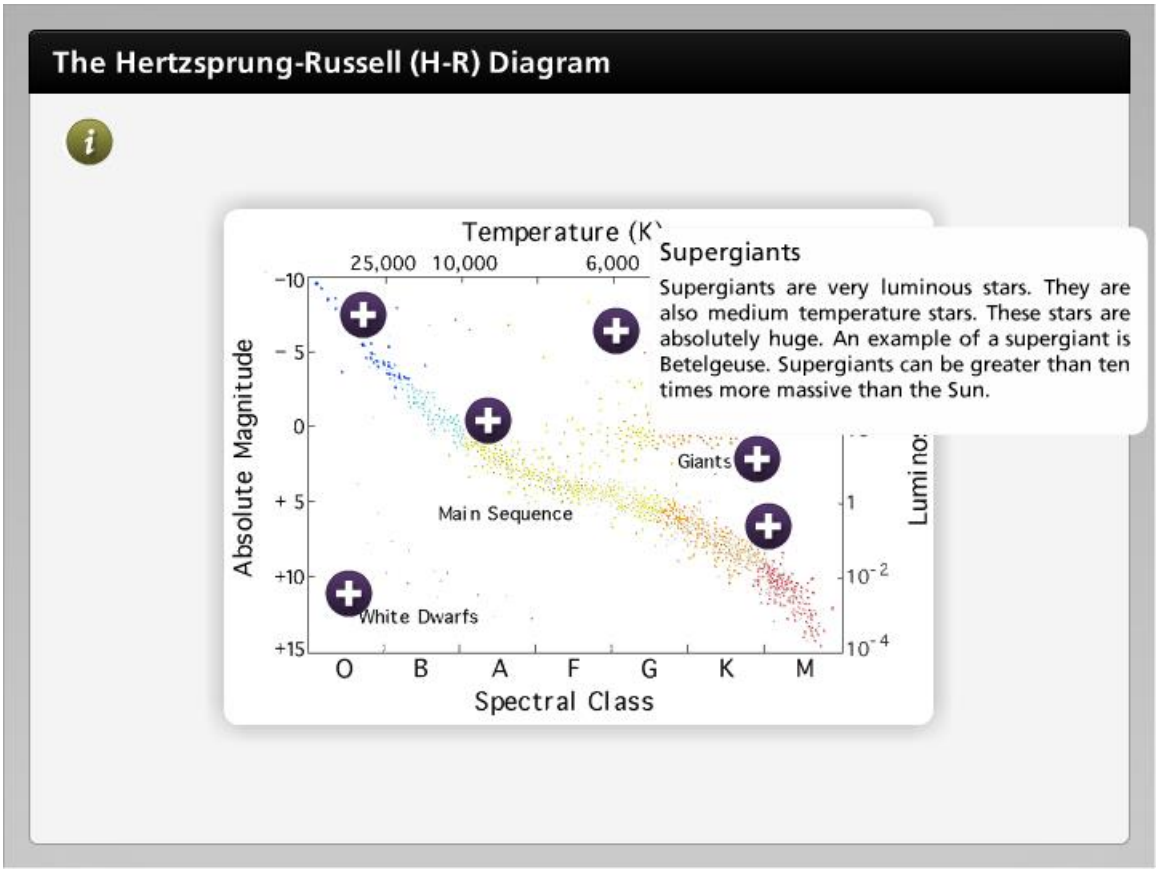
Supergiants



Supergiants are very luminous stars. They are also medium temperature stars. These stars are absolutely huge. An example of a supergiant is Betelgeuse. Supergiants can be greater than ten times more massive than the Sun.

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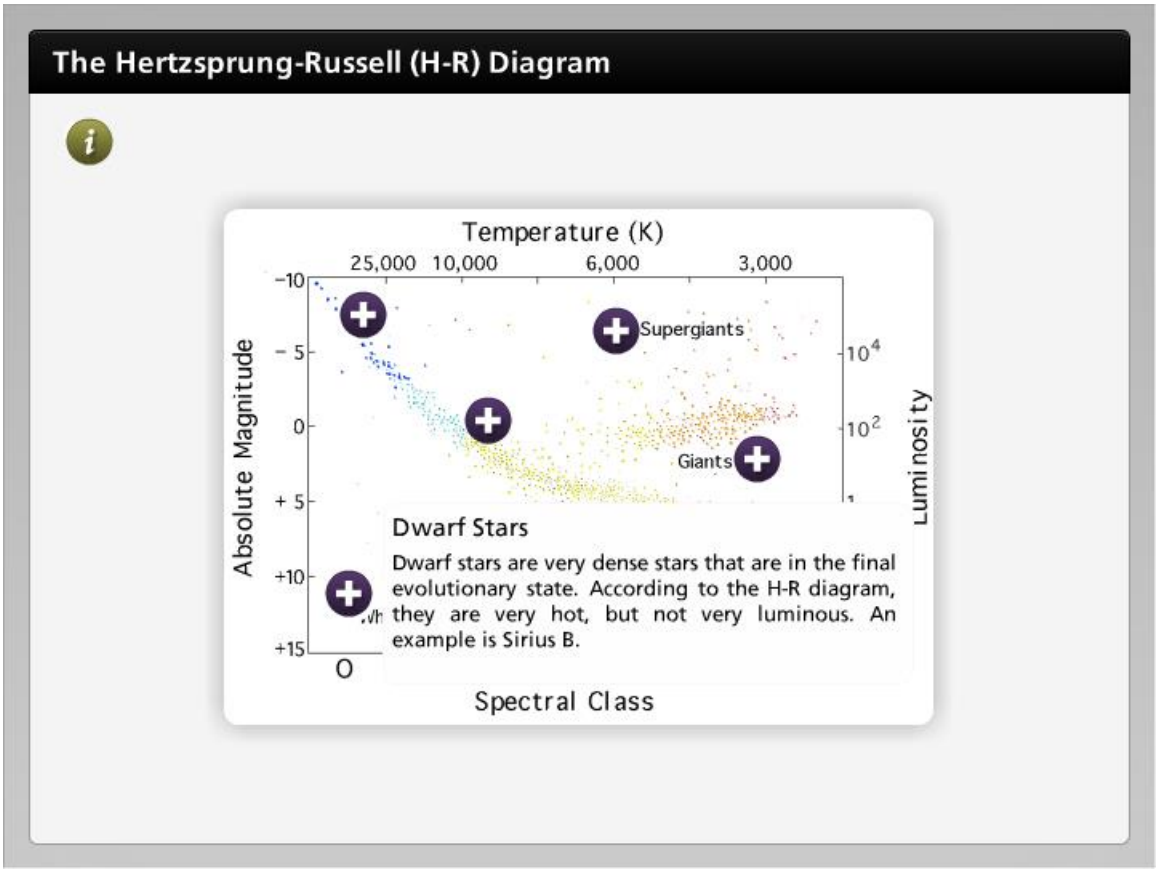
Dwarf Stars



Dwarf stars are very dense stars that are in the final evolutionary state. According to the H-R diagram, they are very hot, but not very luminous. An example is Sirius B.