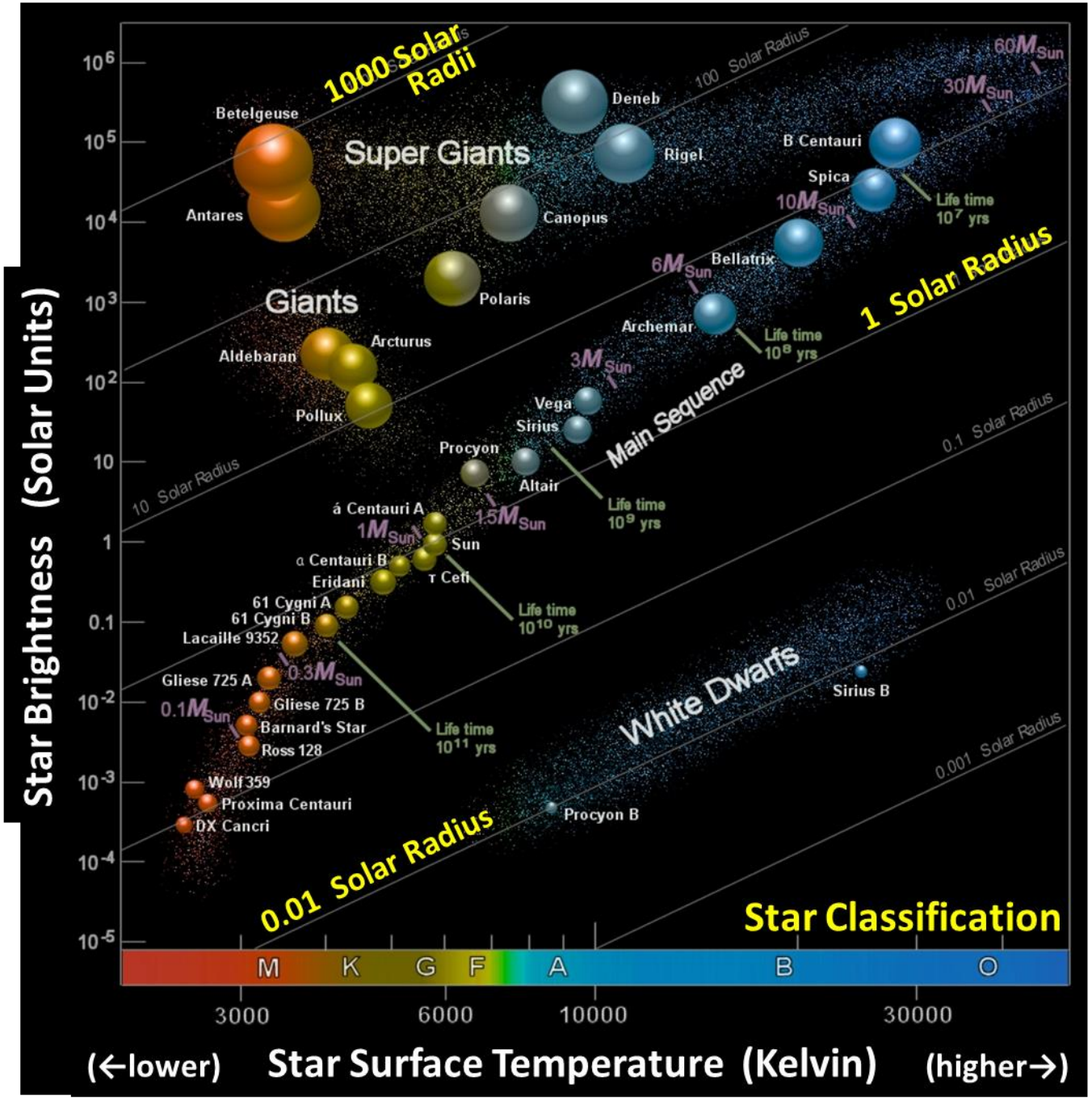
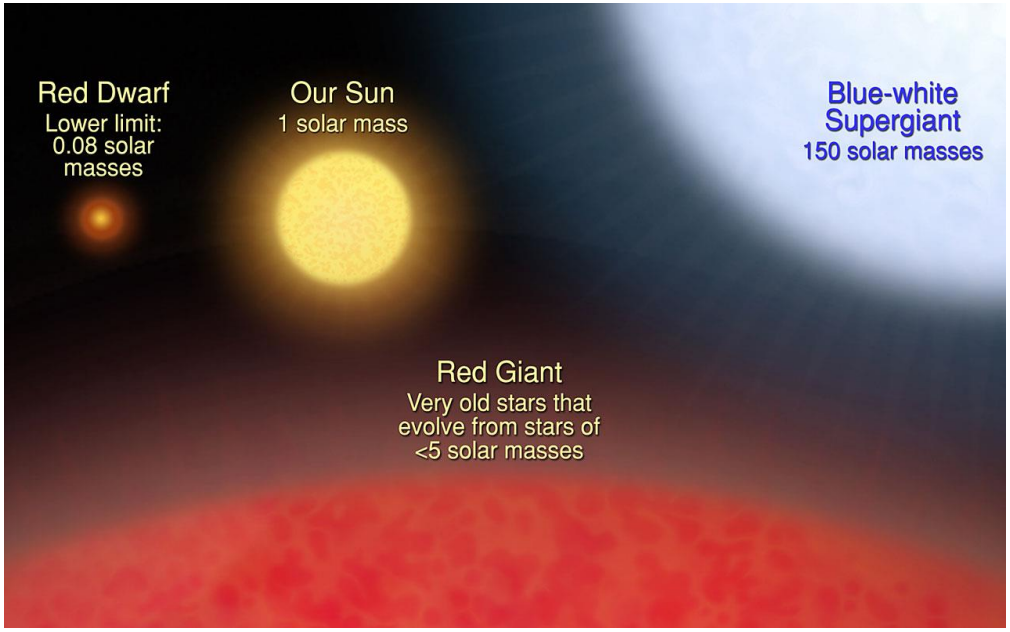


The HR (Hertzsprung-Russell, 1910) Diagram

- A major step towards our understanding of stellar evolution or "the lives of stars".
- Temperature (x) vs Luminosity (y) plot
- Stars tend to group into certain areas.
- Most of the stars occupy the region in the diagram along the line called the main sequence, in the order of their mass (*shown in* M_{Sun}).

How Big are Stars?

- **Stars range in size from neutron stars, which vary anywhere from 20 to 40 km (~25 mi) in diameter, to Supergiants with diameters of several hundred times the size of the Sun (largest known are ~1500 times the size of the Sun).**
- **Red Giants have diameters 10 to 100 times that of the Sun; their *mass*, however, can range from a *fraction of the Sun's mass to only a few solar masses*. A red giant is a "bloated" star near the end of its life.**
- **Medium-size or *dwarf* stars are about as large as the Sun (the Sun is 1.4 million km, or 430 million mi, in diameter and its mass is about $2x10^{30}$ kg, or $4x10^{30}$ lb).**
- **White dwarfs are very small stars, smaller than the distance across Asia.**

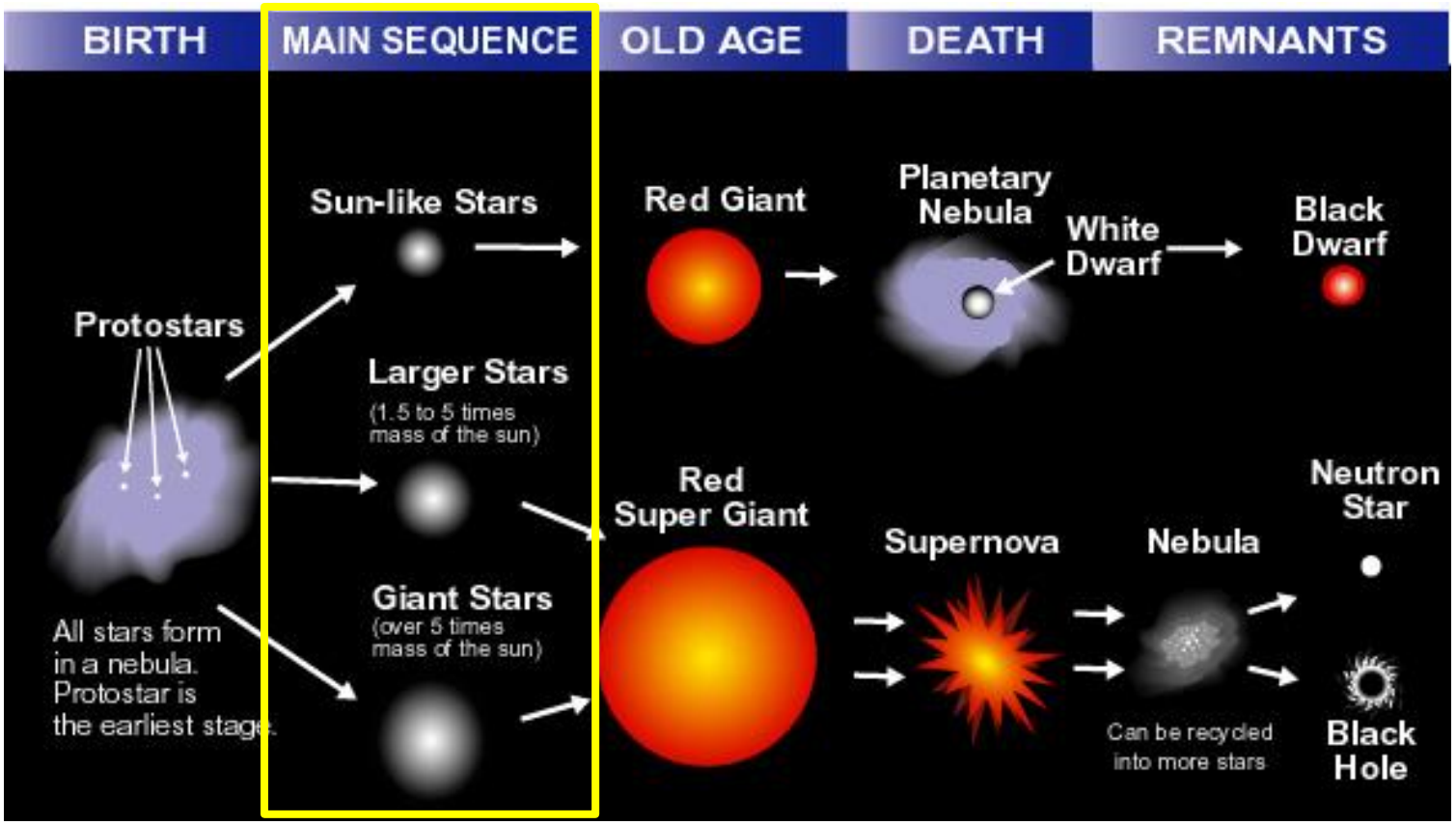


Star Size Comparison Video

http://www.youtube.com/watch?v=HEheh1BH34Q

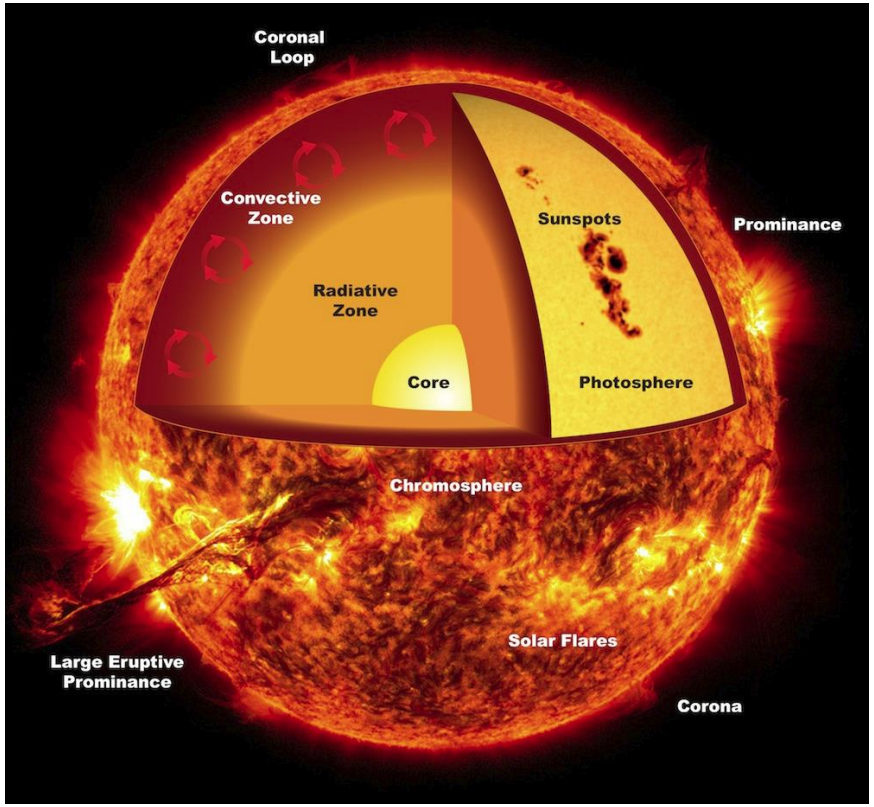
(There are many other “Size/scale Comparison” videoclips on youtube, but I like this (rather old) one because it is not overloaded with information and features great music in the background!)

Life Cycle of a Star

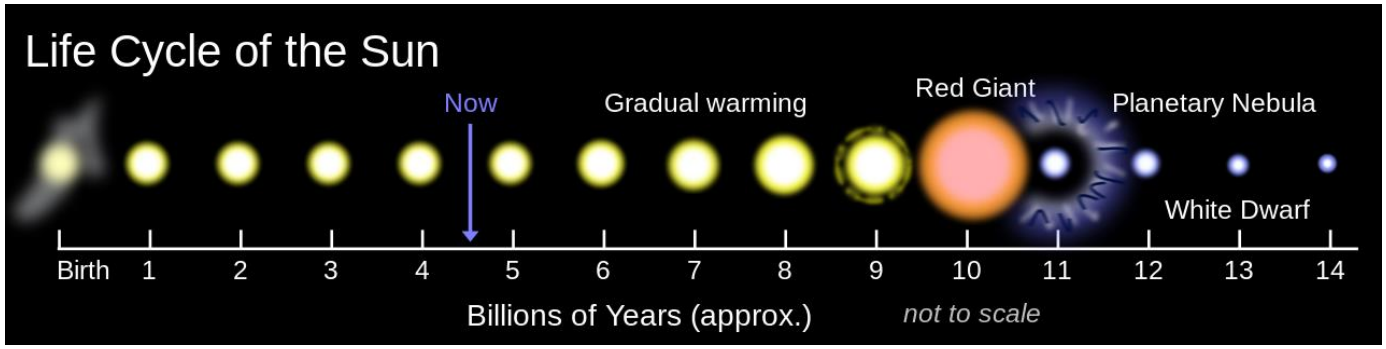


Protostar – superheated gas, earliest stage of a star; Red Giant and Red Super Giant - stars that have exhausted the supply of hydrogen in their cores and are fusing helium to carbon and oxygen; Supernova - a stellar explosion; White Dwarf – very dense stellar remnant that has no energy source and gradually cools down over billions of years to become Black Dwarf, however *no black dwarfs are expected to exist in the Universe yet*!

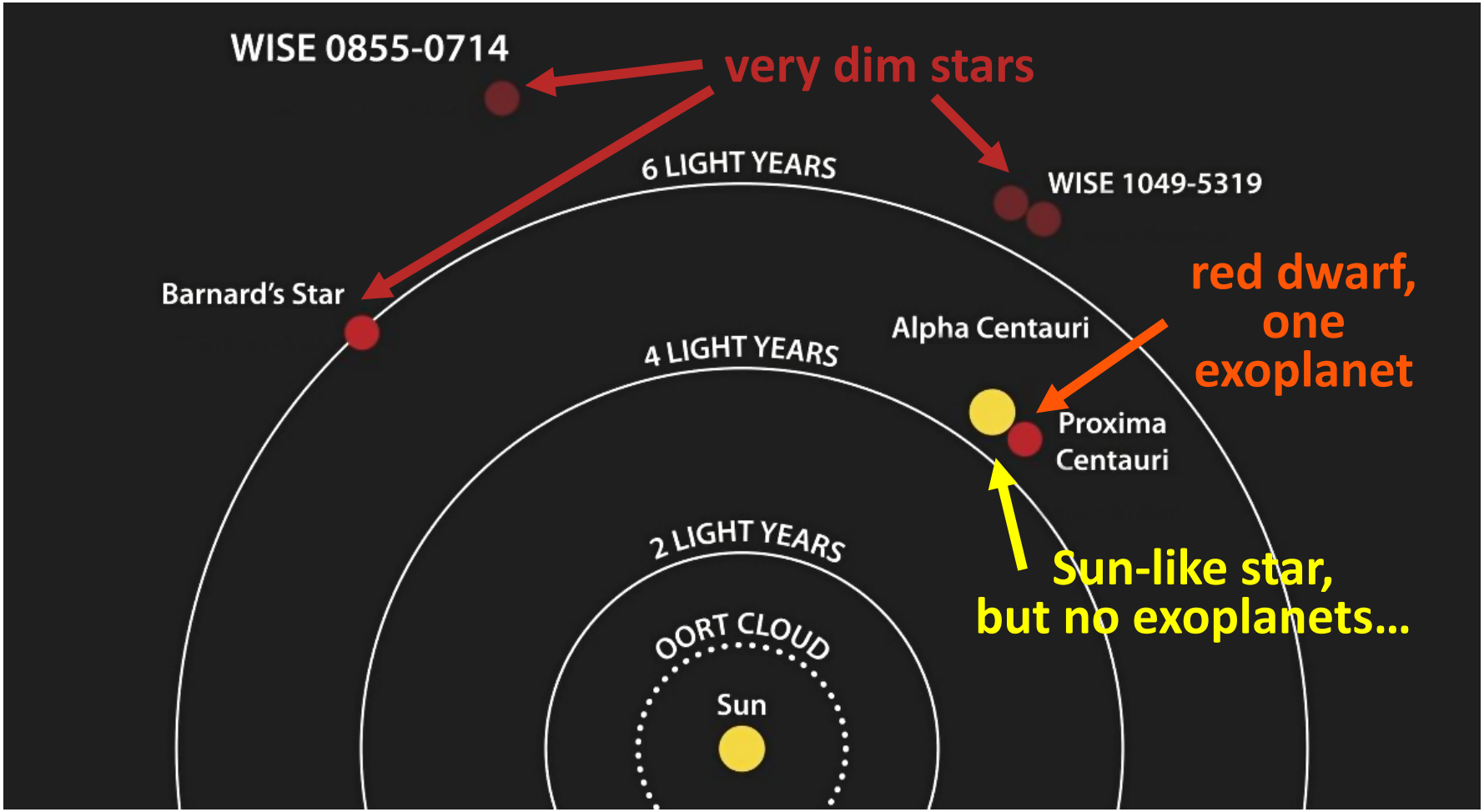
Our star: the Sun



Age: ~4.6 billion years
Shape: near perfect sphere
Rotation: 25.6 days at equator, 33.5 days at poles (due to convection)
Mass: ~330,000 times the Earth's mass
Size: ~109 times that of the Earth
Color: yellow
Temperature: surface ~5700 K, core ~15000000 K
Type: Yellow Dwarf, G-type Main Sequence
Composition: ~75% H, ~23% He, ~1.7% heavier elements including O, C, Ne, Fe ("heavy-element-rich" star)



Sun's Closest Neighbors



Exoplanet: a planetary body orbiting a star other than the Sun

1 light-year equals **5.88 trillion miles**