

Evolution of Stars

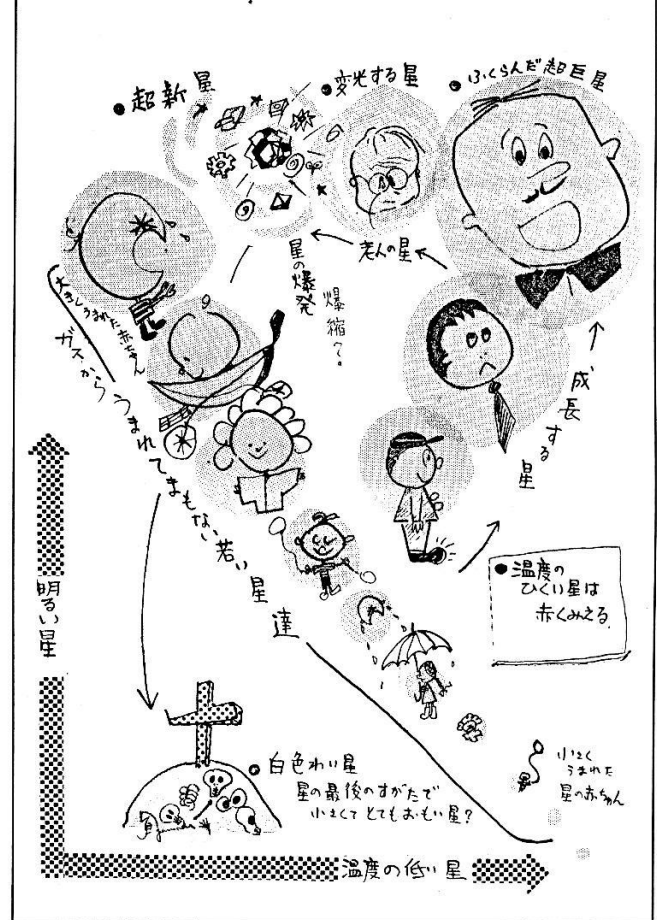
IB PHYSICS | ASTROPHYSICS



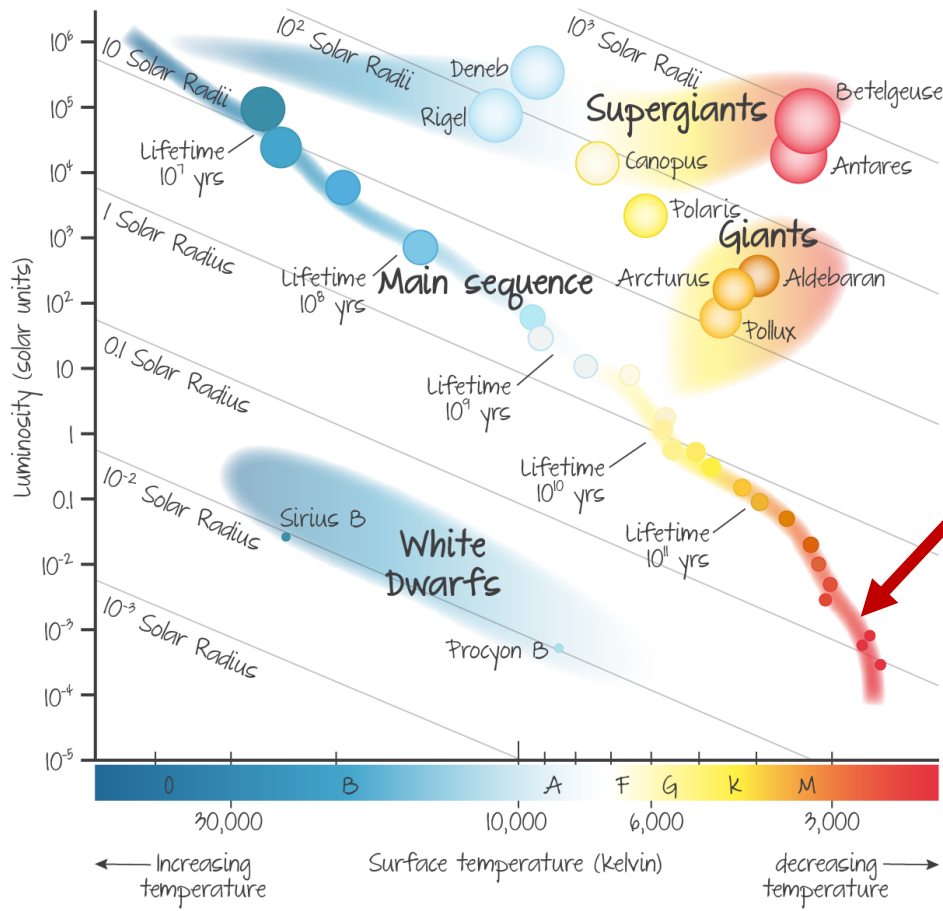
Measuring the Age of the Stars



星の一生について



Life Span of the Stars



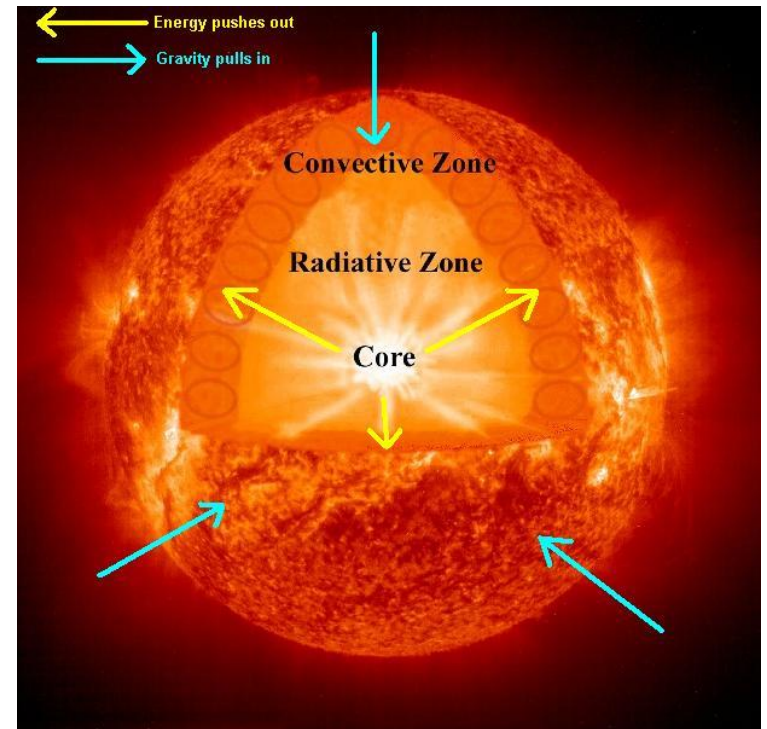
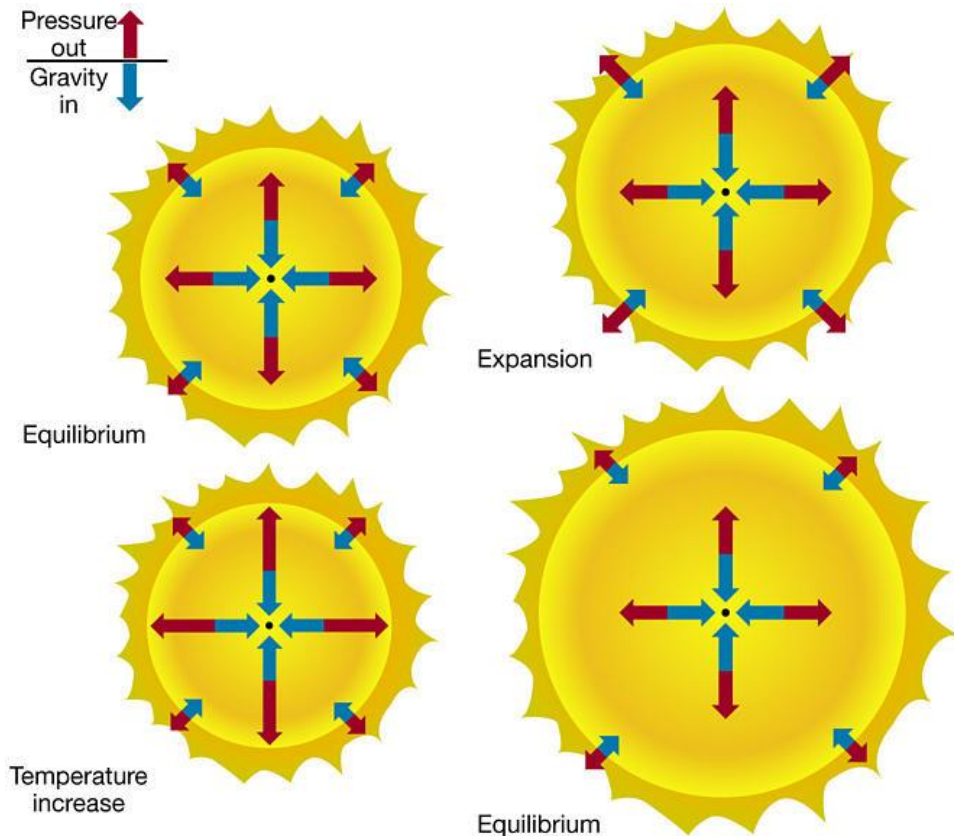
Which stars have the longest life span?

Red Dwarfs

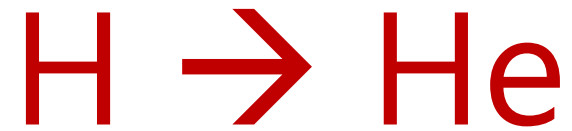
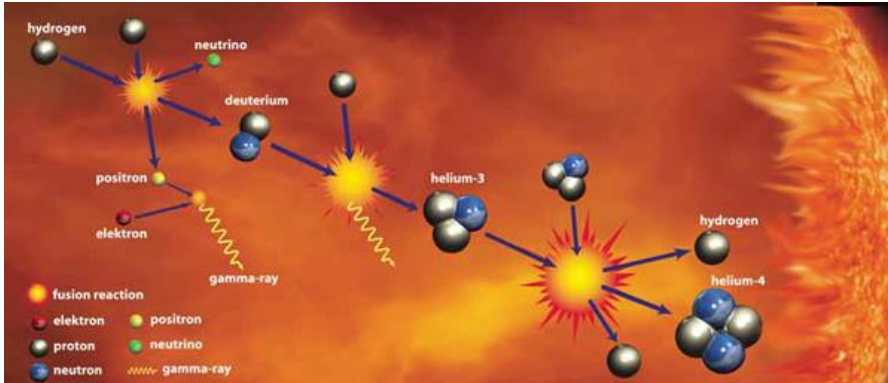
****Hotter stars
burn fuel faster
and die quicker**

Stellar Equilibrium

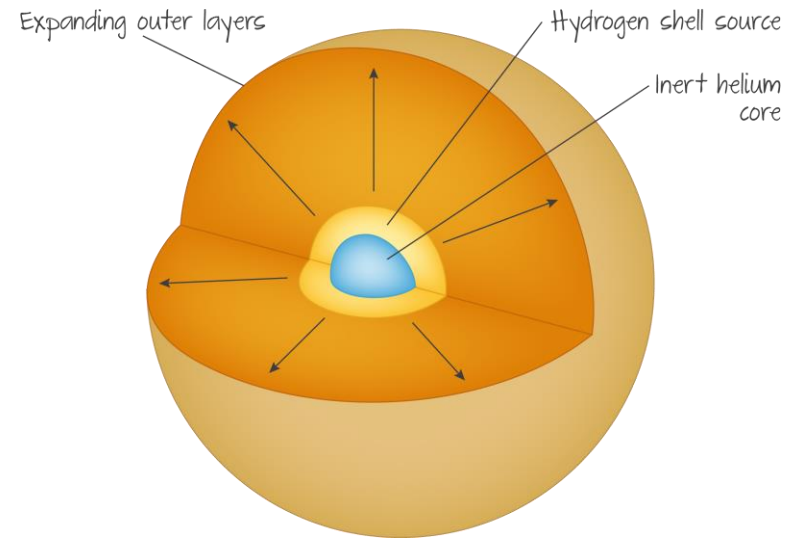
Increasing temperature increases pressure and causes expansion



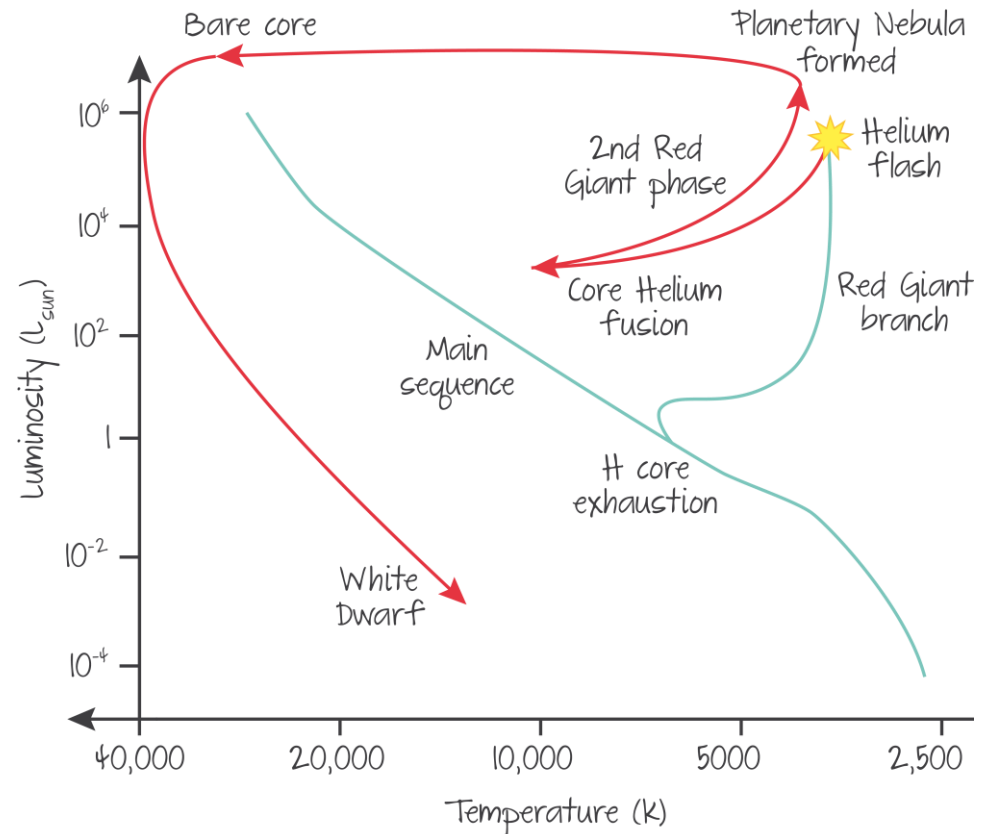
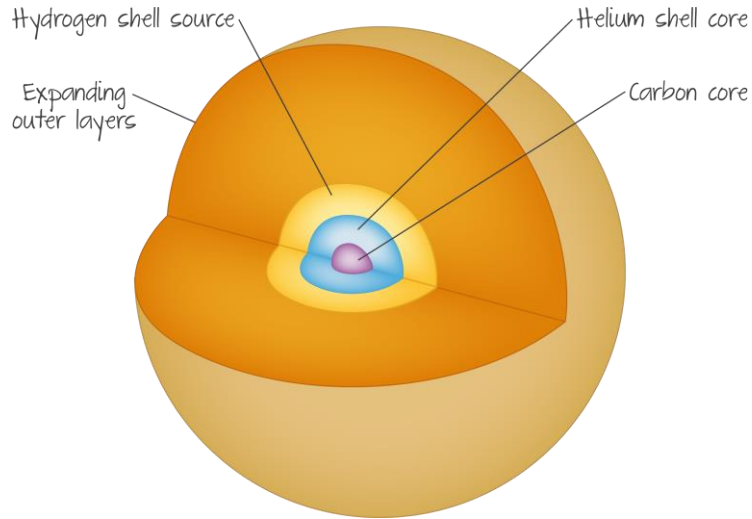
What happens as Stars Age??



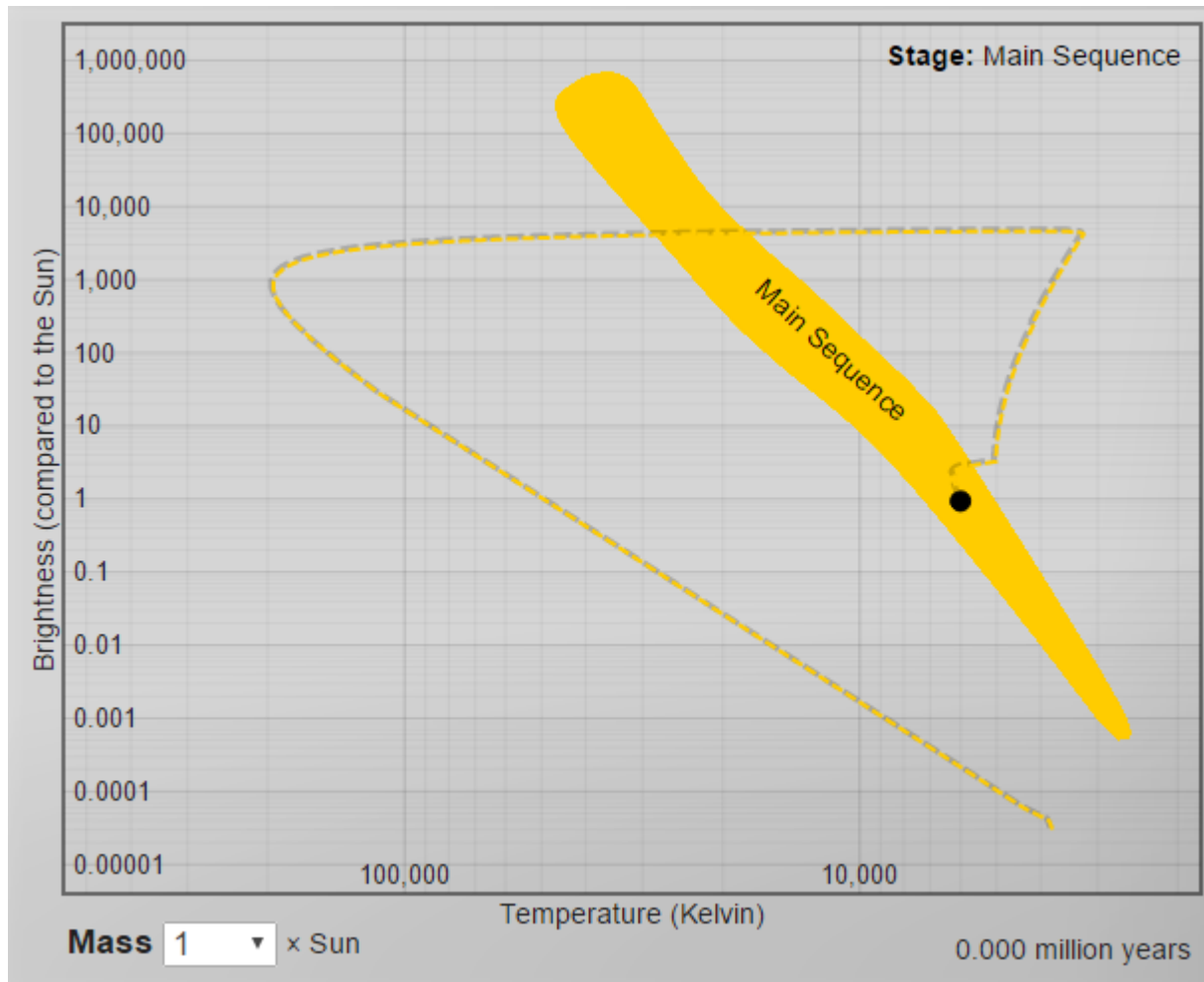
- Heats up
- Hydrogen expands
- $\text{He} \rightarrow \text{C}$



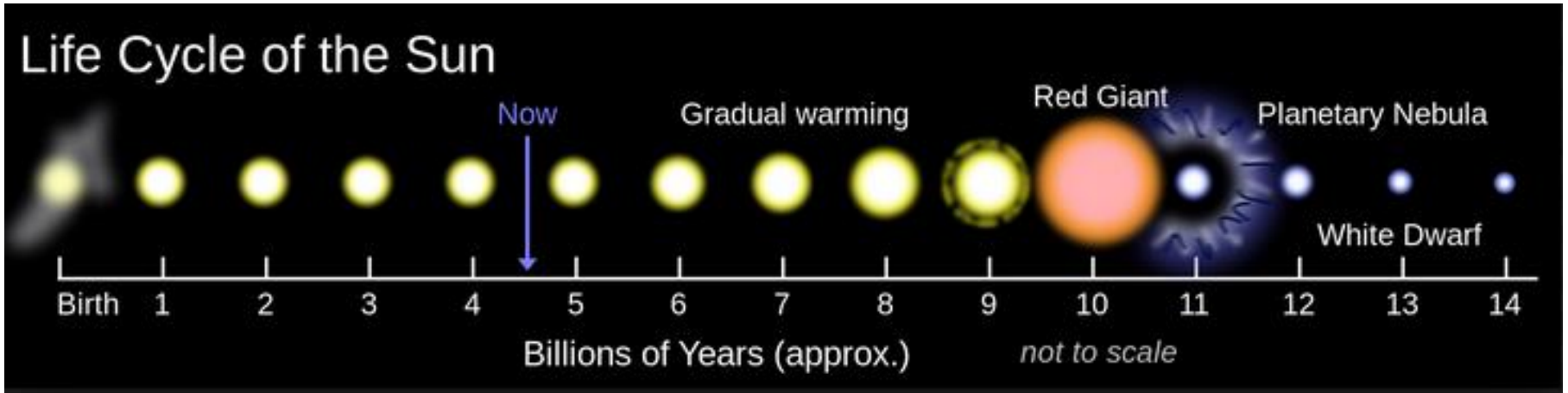
What happens as Stars Age??



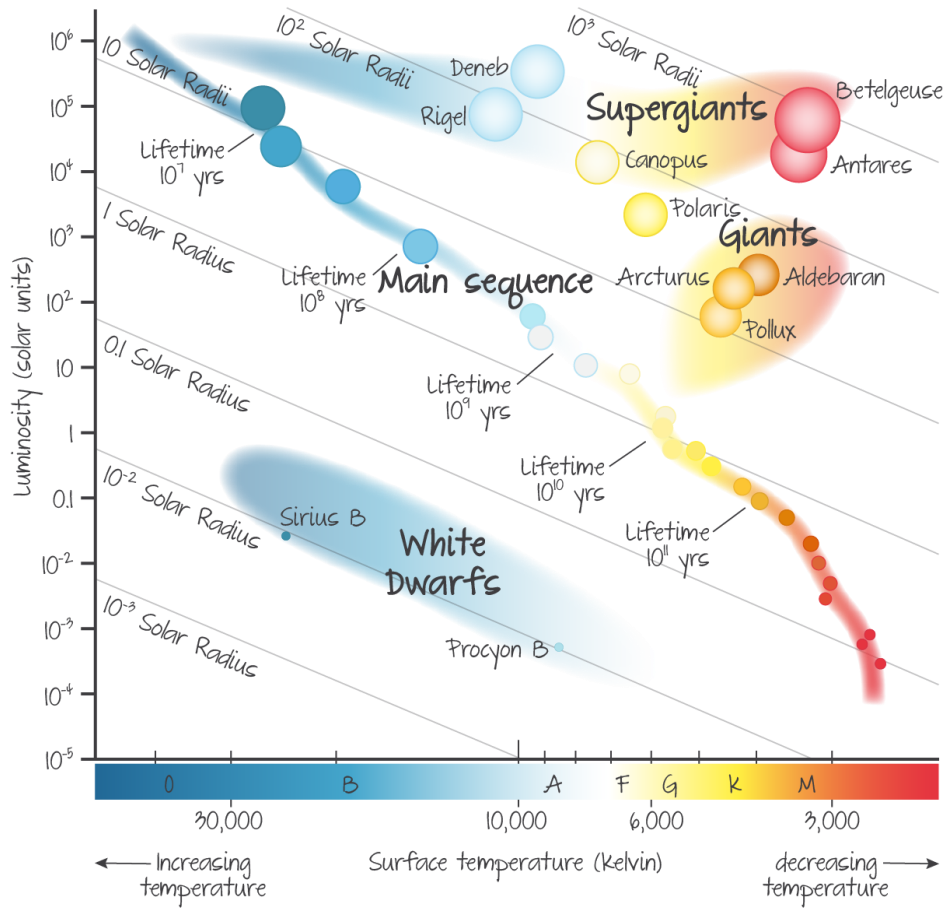
Life Cycle of Sun-Sized Star



Life Cycle of our Sun



White Dwarf Stars




HOT
but
SMALL



White Dwarf Stars

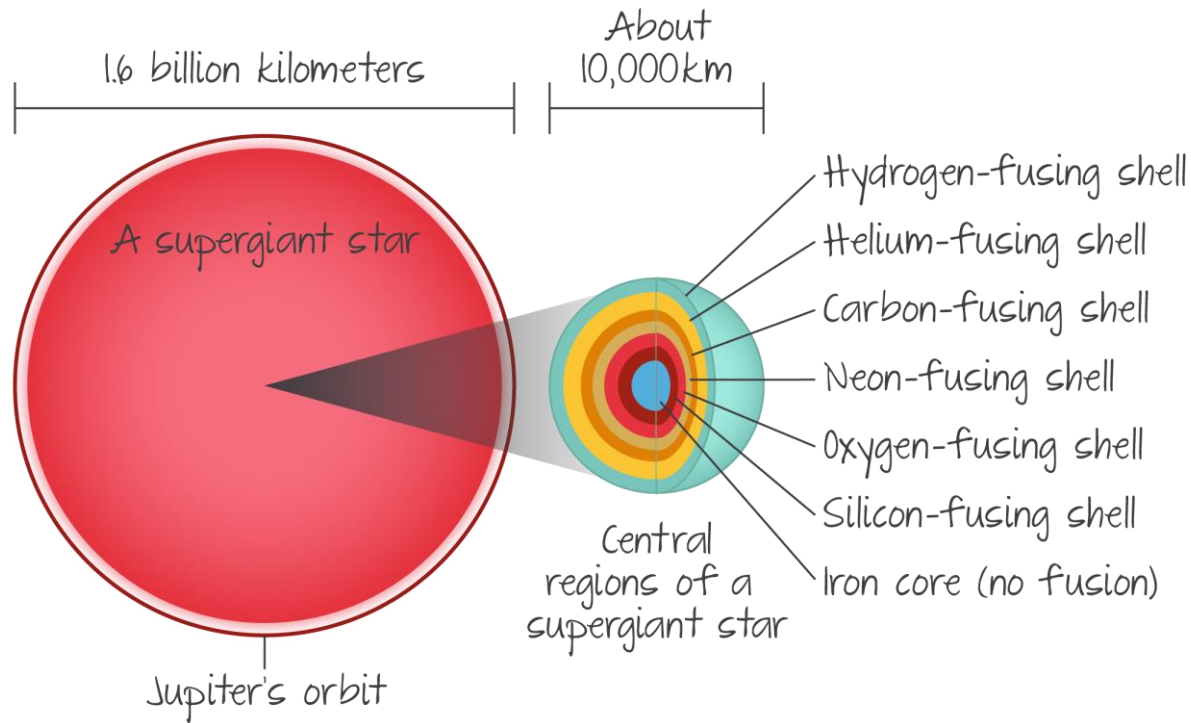
There is a maximum mass of a core that can become a white dwarf

Chandrasekhar Limit = $1.4 M_{\odot}$  Sun's
Mass

The core only makes up about 1/3 of the stars mass so a star with a total mass greater than about $4 M_{\odot}$ will not form white dwarfs

If Star's
Total
Mass $< 4M_{\odot}$ It will become
a White Dwarf

Life Cycle of Massive Star



Life Cycle of Massive Star

The mass of neutron stars are limited as well...

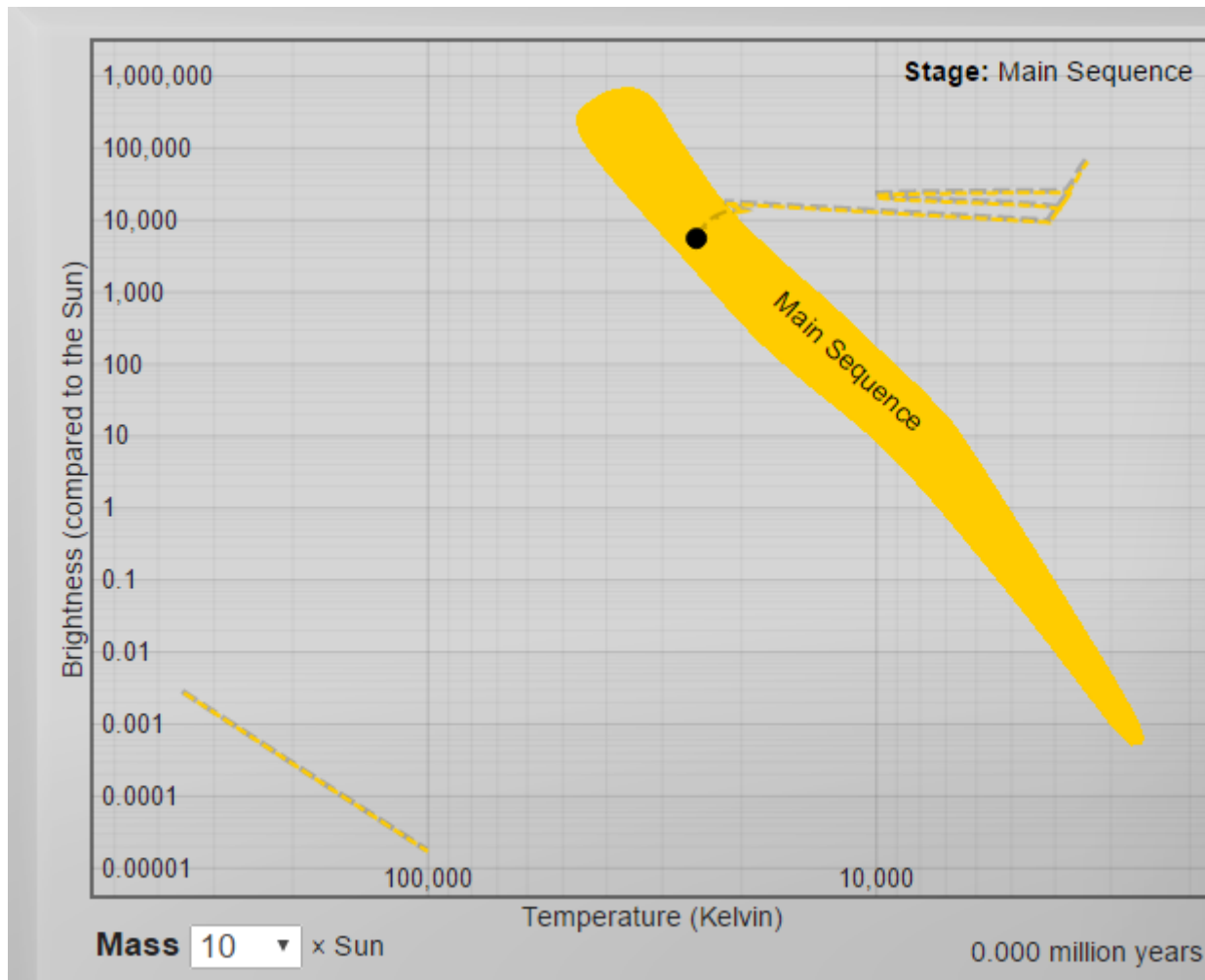
Oppenheimer-Volkhoff Limit = $3 M_{\odot}$

A Neutron star above the Oppenheimer-Volkhoff Limit will collapse and form a Black Hole.

$< 3M_{\odot} \rightarrow$ Neutron Star

$> 3M_{\odot} \rightarrow$ Black Hole

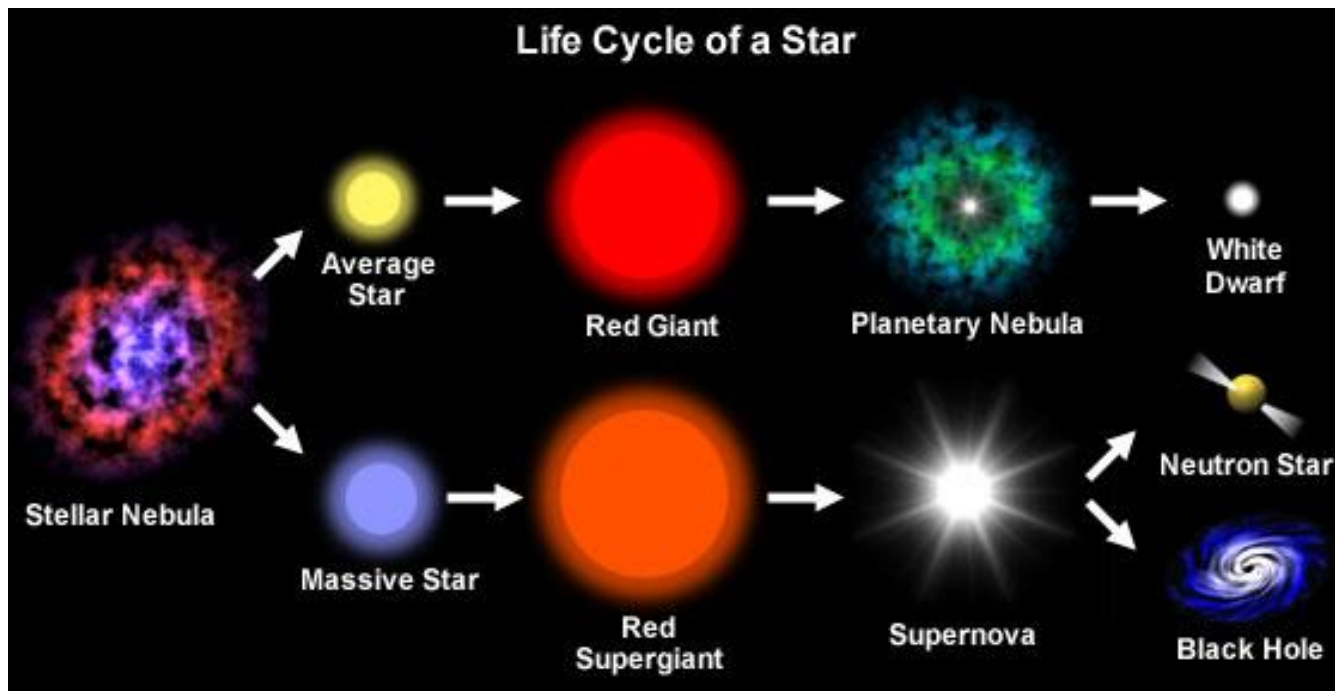
Life Cycle of Massive Star



Black Holes?



Life Cycle of a Star



$< 1.4M_{\odot}$

$> 3M_{\odot}$