

Birth: Nebula

- A cloud of dust and gas
- When the dust and gas contracts under gravity, a protostar is born

Protostar: early stage in the formation of a star, before nucleosynthesis has begun.

Our Sun

Main Sequence (Two options):

- average sized star
- star is stable... reaches equilibrium
- can last up to 10 billion years

H → He

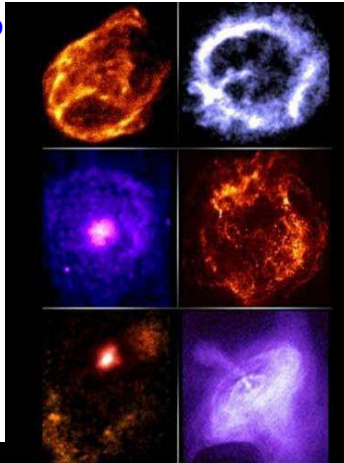
- massive sized star
- can last less than 1 million years

Old Age: Red Giant

- Hydrogen in core is depleted
- core contracts and heats up
- heat causes the outer layers to expand
- expanding causes the layers to cool

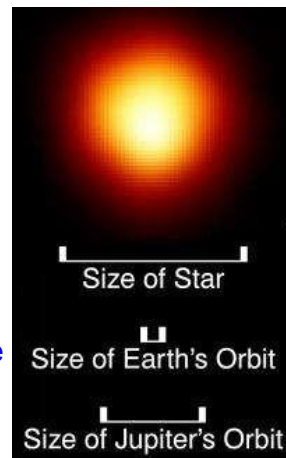
Death Part 1: planetary nebula

- all He has fused into carbon
- core collapses again
- outer layers of star are expelled into space



Red Supergiant

- hotter larger and more orange than a red giant



supernova

- all of the helium in the supergiant has fused into iron
- the core collapses violently
- the outer portion of the star explodes
- Very bright

Death Part 2: white dwarf

- core contracts even more
- more layers expelled into space
- leaves behind only hot dense core about the size of earth

Multiple Death Options...?:

neutron star

- a) if the core of a supernova has 2 times more mass than the sun
- the core shrinks to 20 km in diameter
- only neutrons can exist there
- 1 tsp = 100 million tons

More...death?: Black dwarf

- a non-radiating ball of gas where fusion has ceased

non-radiating → gives off no energy

black hole

- b) if the core of a supernova has 3 times more mass than the sun
- core collapses to the point that it has no volume
- gravity is so strong that nothing can escape, not even chuck norris or light