

## ★ The Life of a Star ★

**Stars evolve from clouds of gas and dust and follow a predictable series of stages: they begin, develop and DIE.**

**Scientists have pieced together information to help us understand the life of a star.**



**We know that gravity is the force of attraction that pulls objects towards each other. The more mass an object has, the more attractive force it exerts.**

**Thus the sun has Stronger gravity than earth**



**Force does get smaller as the distance between objects increase**

# Nebulas

## STARTING MATERIAL OF ALL STARS


- dust and gases swirl around, breaking into clumps and contracting because of gravitational forces.
- as clumps bump into each other they get bigger, gravity gets stronger, able to attract more particles and pack tightly together
- eventually they clumps are dense and hot enough for nuclear fusion
- New star formed

## Figure 2 The Life of Different Stars

When stars run out of fuel and hydrogen, red stars occur followed by supernovas or white dwarf stars.

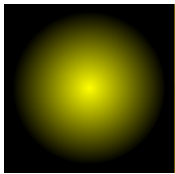
**What happens?**

When they lose their fuel the pressure that holds the star together reduces and the star swells up and cools down becoming a red color.

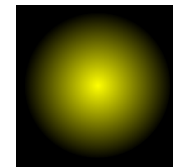


The Last Star in the Universe – Red Dwarfs Explained

<https://www.youtube.com/watch?v=LS-vFyLaJFM>



## Yellow Stars



Like the Sun, these medium-sized stars are yellow because they have a medium temperature

Their higher temperature causes them to burn their fuel faster. This means they will not live as long, only about 10 billion years or so.

Near the end of their lives these medium-sized stars swell up, becoming very large. When this happens to the Sun, it will grow large enough to engulf even the Earth. Eventually they shrink again, leaving behind most of their gas. This gas forms a beautiful cloud around the star called a Planetary Nebula.

Planetary Nebula:



**When will the Sun expand into a giant, and then shrink leaving behind a planetary nebula?**

Don't worry, the sun is only about 5 billion years old. It still has another 5 billion years or so before it will expand and turn into a planetary nebula.

Once the sun dies, it will still glow for many billions of years after that. As it cools, it will be what is called a white dwarf star. Eventually, after billions, maybe even trillions of years, it will stop glowing. At that point it will be what we call a black dwarf star. (No know black dwarfs in the universe yet)

## Figure 2 The Life of Different Stars

### Star the size of OUR SUN

A star the same size of the sun or smaller dies when nuclear reaction dies down, the core shrinks, and the outer layers of the star drift away leaving a white dwarf.

White Dwarf: has higher temperatures than a red or yellow star, thus it will cool and fade

Figure 2 The Life of Different Stars

## Low mass STAR

- small/med nebula
- gradually become hot dense clump
- nuclear fusion for 10 billion years
- swell into large, cool red giant
- becomes small, hot, dense white dwarf star
- white star eventually cools & fades



## Figure 2 The Life of Different Stars

### Mass of a Star 10 times the mass of the SUN

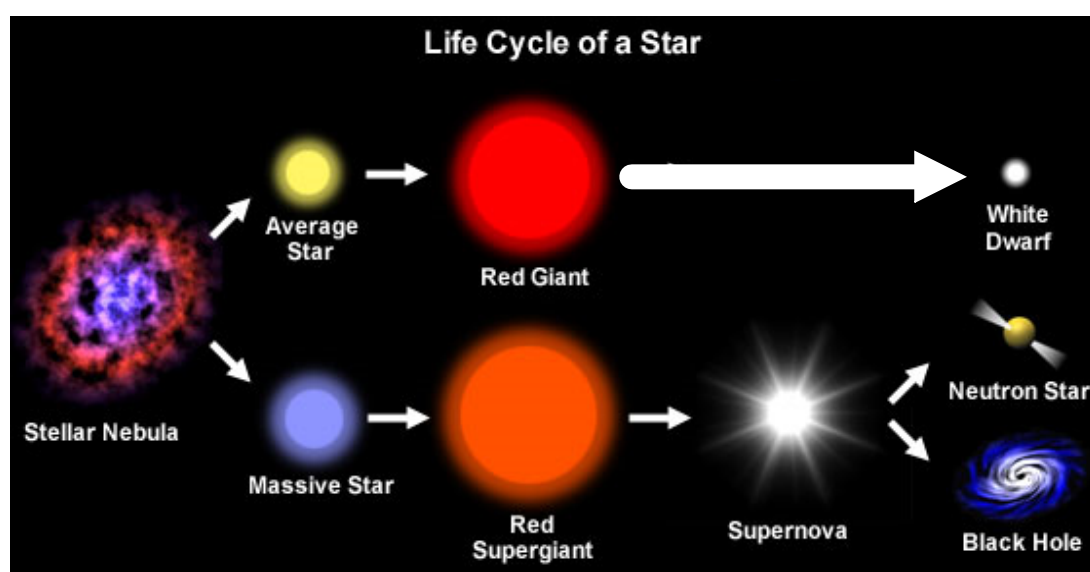
- large nebula
- short time-becomes hot dense clump
- nuclear fusion only few million years
- swells to become red super-giant
- core collapses, supernova occurs
- turns into a neutron star,
- gases drift off
- new nebula is formed
- Process starts over

+. Explain the term red giants, red super giants and white dwarfs.

**Red giants** - low mass star near the end of it's life that becomes larger and redder as it runs out of hydrogen fuel.

**Red Super giant** - a star with a mass 10 times or more larger than the Sun's near the end of it's life, that becomes larger and redder as it runs out of hydrogen fuel.

**White dwarf** - a small star created by the remaining material when a red giant dies.



## Attachments

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How\_the\_Universe\_Works\_\_Extreme\_Stars\_.wmv