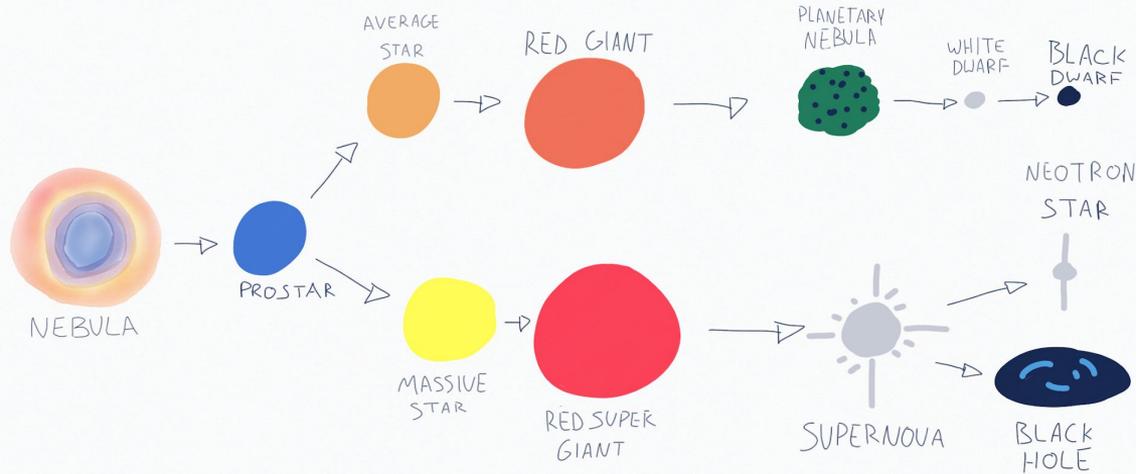




# How Does The Star Cycle Relate To Black Holes

By Izzy, Sydney and Isobel

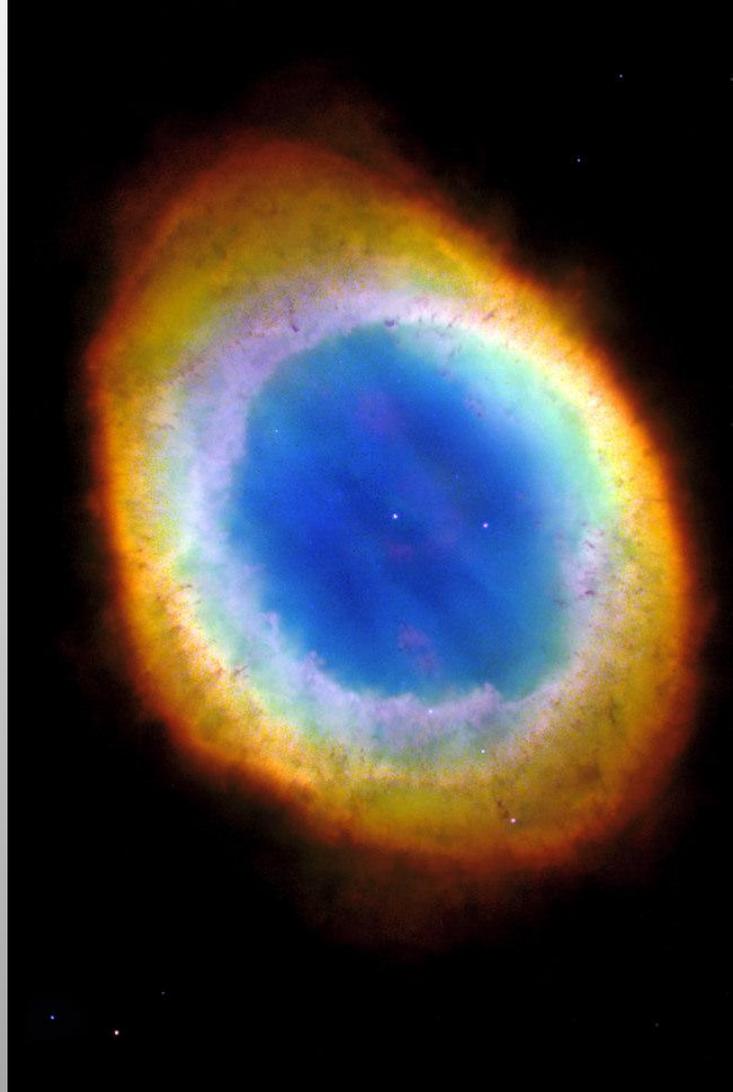
# A STAR LIFE CYCLE



The main reason there are different kinds of stars is just like humans and animals, stars have a life cycle. The different stars are simply the different paths that stars can take while "growing up." Depending on the amount of gravitational pressure and mass, the stars could either one day become anything between a dwarf star and a supergiant that will one day implode itself.

# Stage 1 - Nebula

The star cycle starts off with the nebula, which is the birthplace of stars. Stars are formed when the nebula collapses in on themselves. The nebula is a cloud of gas and dust in outer space, visible from the night sky either as an indistinct bright patch or as a dark silhouette against other luminous matter. The nebula can collapse due to an increase in gravity.



## Stage 2 - Star

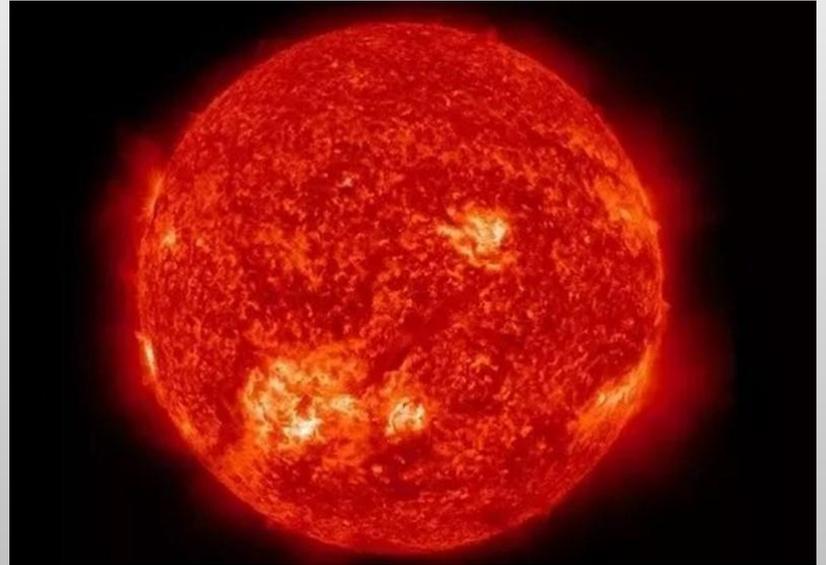
A star is a luminous sphere of gas that produces its own source of heat and light by nuclear fusions. The nuclear fusion is the process of when temperatures and pressure are high enough, hydrogen nuclei fuse to form helium nuclei, with a small loss of mass. The fusion of six hydrogen protons produces a helium nucleus with two protons and two neutrons. Stars live for less than a million years before they explode as supernova.

## Stage 3 - Red Giant

The Red Giant is the brightest star. It has a cool surface and like the sun, it runs out of hydrogen fuel in the centre.

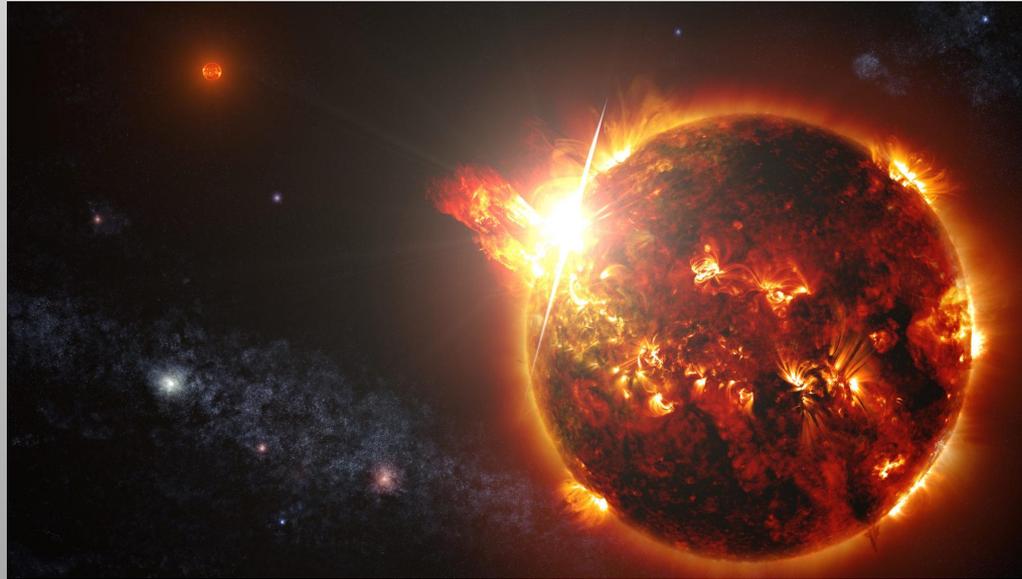
They have the diameter between 10 and 100 times that of the Sun. The temperature is lower

than the sun, it is 2000-3000 degrees C. These very large stars are often called Super Giants. Super Giants have diameters up to 1000 times that of the Sun.



## Stage 4 - Red Dwarf

These stars are extremely small, they are approximately one tenth the mass and diameter of the sun. They also burn very slowly and their estimated lifetime is 100 billion years.

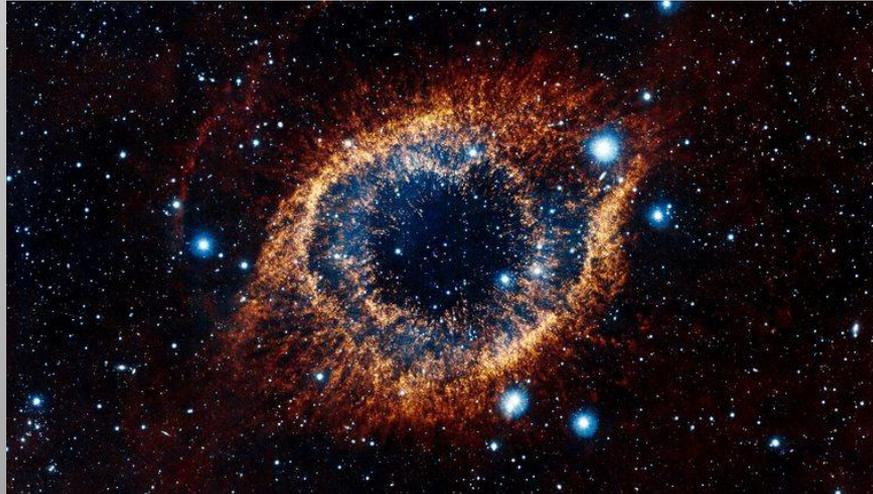


## Stage 5 - White Dwarf

When a star has fully run out of hydrogen and no longer creates an inner and outer pressure causing it to pull together. However there is a shell of hydrogen around it causing its life to continue and increase up to 100 times larger than when it was a pro star. A white dwarf continues to glow because it was a hot star and will take hundreds of billions of years to fully cool down. Interestingly so far no white dwarf have fully cooled down yet.

## Stage 6 - Supernova, Type 1

This is the stage where the star explodes. The supernova often results in the star obtaining the brightness of 100 million suns for a short time. They are the largest explosions in space. They occur about once every 50 years. Supernova type 1 mostly originate from white dwarf stars.



# Supernova, Type 2

Supernova type 2 forms from Super Giants. A core of iron builds up in the centre of the Super Giant. Eventually the mass builds up to 1.4 times the mass of the sun and the core collapses. There are two key events that happen:

- Protons and electrons are pushed together to form neutrons and neutrinos
- The outer layers fall inward when the iron core collapses. When the core stops collapsing, the outer layers crash into the core and rebound, sending shock waves outward.



These events cause the entire star to explode.

# How Do Black Holes Relate?

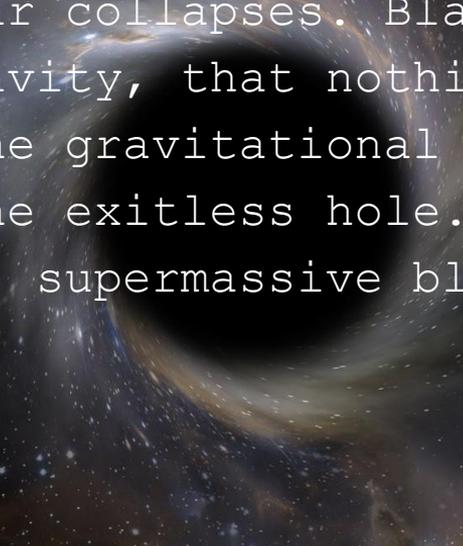
As a group, we wondered how black holes could relate to the star cycle. How could something as dangerous and deadly as a black hole be related to the life of a star?

We decided that the only possible relation would have to be the destruction of a star, meaning the end of a stars life.

Once we had our prediction, it was time to research!

## Stage 7 - Black Holes

Black holes relate directly to star cycles because they are created when a star dies. The biggest aspect of this transformation is the gravitational pull that is created when the star collapses. Black holes have such a strong force of gravity, that nothing can escape from them. In addition, the gravitational pull attracts planets and sucks them into the exitless hole. There are three types: stellar black holes, supermassive black holes and intermediate black holes.



# The Role Of Gravity

Gravity plays a huge role in the star cycle because gravity is what pulls the dust and gas together to create a star. In addition, when a large star collapses, the force of gravity is what creates a black hole. The largest factor of a black hole is its gravitational pull, which pulls in planets and entire solar systems. The gravitational pull is very strong and an important part of the star cycle.

