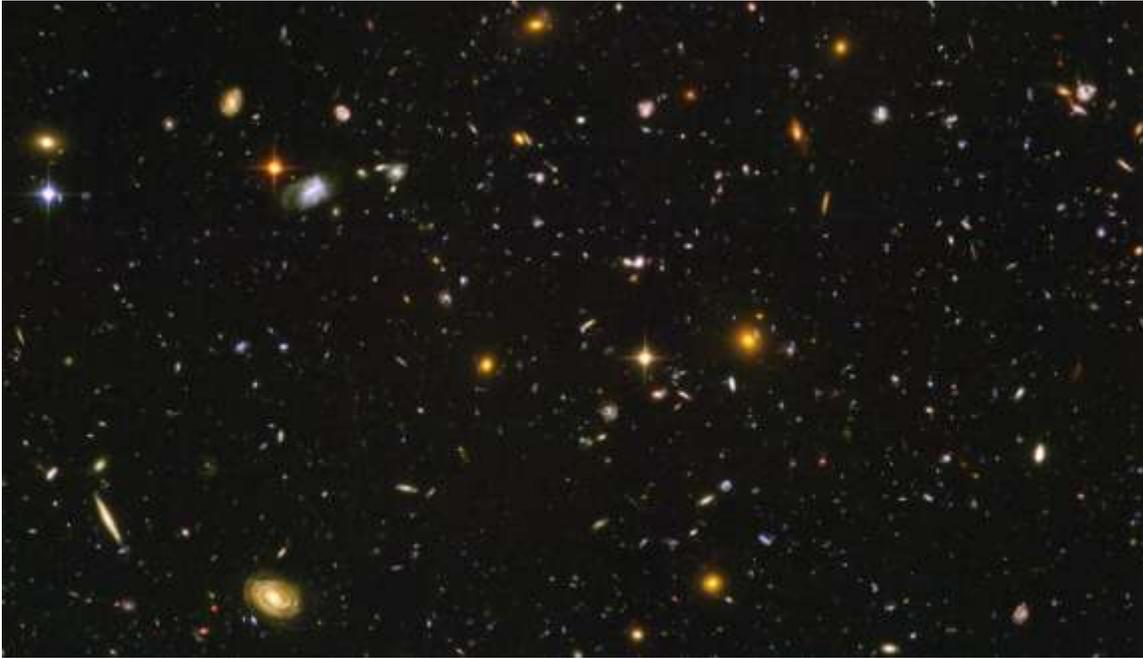


The Universe Recycles



The Hubble Deep Field image shows galaxies and stars from just a few billion years after the Big Bang.

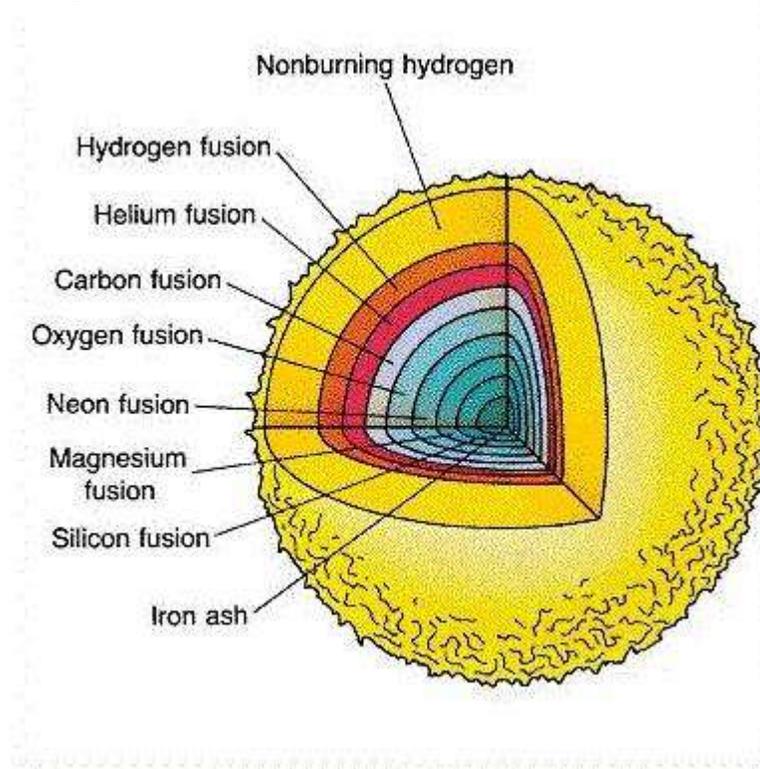
Stars have a life span. Cool, relatively small stars such as our Sun will shine for up to ten billion years. Right now our Sun is middle aged at about five billion years. It is too small to create a Super Nova when it expires. That's for the bigger stars. Instead our Sun will end as a nova and recycle itself quietly in the form of elements that can create new stars and new life. Here's a brief overview of what happens inside a star like our Sun.

In the early stages of its life a sun-like star is fuelled by hydrogen. What happens inside the star's core is that the hydrogen is heated to 15 million degrees Celsius and compressed by the pressure exerted on it by the stars mass. In a star like our Sun that's 340 billion times the air pressure exerted on you by the Earth's atmosphere. That works out to about 3.84 trillion psi. Ouch!

Eventually the hydrogen is fused into helium. In the process, a bit of energy is given off. That energy causes the star to shine and stabilizes it in its battle between explosion and collapse. The process is called nuclear fusion. It's the same as the hydrogen bomb.

As the star ages its supply of hydrogen runs low and it switches to another fuel – helium. Carbon is next on the list of fuels. The procession of fuel switches continues until the star tries to burn iron. However, once iron is reached, fusion is halted since iron is so tightly bound that no energy can be extracted by fusion. Iron can fuse, but it absorbs

energy in the process and the core temperature drops. The end result is that the star collapses.



The core collapse takes just seconds and the huge amount of inbound star material reaches a point where it rebounds outward in a massive explosion. It is one of the most violent events to take place in the universe. During that explosion heavy elements like carbon, gold and all the constituents of life are formed. That's where the iron in your blood came from. All the carbon that we carbon-based life forms are made of is the result of exploded star stuff.

So if it weren't for Super Novas, we wouldn't exist. There'd be no periodic tables hanging on the walls of your chemistry class and there'd be no chemistry class.

Brighter, hotter stars are the live-fast-die-young members of the stellar community. These behemoths can have a life span as brief as one million years. They burn their primary fuel – hydrogen – up quickly. With their explosion heavy elements are created and strewn across the universe. After a few thousand million years clouds of gas seeded with the heavy elements created in countless Super Novas come together to form planets, moon and eventually creatures like us.

In the words of astronomer Carl Sagan, we are all “star-stuff”.