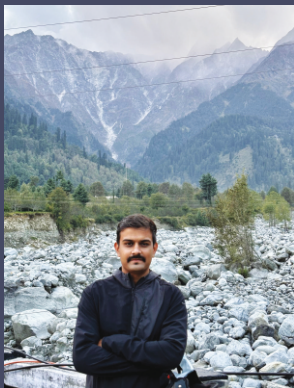




Anirudh Sukhwat was born and brought up in Udaipur, Rajasthan. He has completed his B.Tech., in Chemical Engineering in 2014, then worked in J.S.W Steel Bellary Karnataka. He is currently undergoing A.C.F training at Central Academy for state forest service Coimbatore T.N. Among his hobbies include Tennis, Cooking, read about Astronomy, Adventure activities. As a forest officer he believes in conservation of forest in era where economic growth is given more prominence, sustainable use of resources together with conservation of forest and wildlife is the strategy to be followed for glorious future. Forest and Wildlife also have equal share of this land just like humans, as we all are mere star dust.



Anurag Maharshi was born and brought up in Jaipur, Rajasthan. He has completed masters in Mathematics. He is currently undergoing A.C.F. Training at CASFOS, Coimbatore. His hobbies include playing basketball, reading about abstract ideas, bike trips, etc.

He is passionate to work for conservation and management of biological and ecological resources. He also wants to work which will help in implementing strategies to mitigate and adapt to climate change's effect on forests.

He is interested in the Forest Economics related issues and wants to study more about the economical valuation of the Forests.

GUESS YOUR AGE !!!

(EASY BUT NOT SO EASY TO ANSWER)

ANIRUDH SUKHWAL
ANURAG MAHARSHI

GUESS YOUR AGE!!!

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**CENTRAL ACADEMY FOR STATE FOREST SERVICE
COIMBATORE**

2024

FOREWORD

In the vast tapestry of the universe, where stars are born and galaxies collide, lies a realm of wonder that transcends our understanding. This book invites you on a journey through the cosmos, exploring not only the celestial bodies that fill our night sky but also the unconventional ideas that challenge our perceptions of space and time together with philosophical ideas.

Here, you will encounter the good balance of established science interwoven with imaginative hypotheses. This book serves as a portal to a world where curiosity reigns, encourages you to question the known and explore the unknown.

As you embark on this adventure, remember that the pursuit of knowledge is not just about answers; it is about the questions that ignite our imagination. Let this book inspire you to look beyond that you can see and feel, embrace the infinite possibilities that lie within the Universe and more importantly the Universe within ourselves.

Best Wishes,



V. Thirunavukarasu, IFS
APCCF & Principal, CASFOS, Coimbatore

PREFACE

The universe is a vast expanse of space that contains everything we know to exist. It includes planets, stars, galaxies, and everything in between. It's so big that it's out of human's comprehension. Scientists believe that the universe began with a massive explosion known as the Big Bang. This explosion created all the matter and energy that we see today. It occurred about 13.8 billion years ago and set off a chain of events that would lead to the formation of galaxies, stars, and planets. Gravity is major force that holds everything in the universe together. It's the reason why planets orbit around stars and why stars are held together in galaxies and responsible for life on Earth and anywhere else. The universe is vast and complex, but we're slowly unravelling its mysteries. We've come a long way in our understanding of the universe since the days of Aristotle and Galileo, but there's still much we don't know.

This book helps the reader to understand the origin of life with some philosophical and religious aspect which writers feel in a way connected to this topic. The writer would like readers to think how they came in to existence and how matter is formed in this materialistic world around us, being mortals let this book inspire you to contribute good and meaningful things to our society and world, which could be remembered till we are here and after we are long gone, rather than chasing wild and unending materialistic dreams.

Anirudh Sukhwai & Anurag Maharshi
Officer Trainees, 2022-24 SFS Batch-II, CASFOS, Coimbatore

ACKNOWLEDGMENT

We would like to express our heartfelt gratitude to Principal CASFOS Coimbatore Shri V. Thirunavukarasu IFS for his unwavering support and encouragement throughout the process of creating this book.

We are also deeply grateful to the dedicated faculty member of CASFOS Coimbatore Dr. V.S.Senthil Kumar IFS, Dr. C. Vidhyasagar IFS, and our Course Director Shri AnishaKalkoor M. IFS, for their support in bringing this book to fruition. Special thanks to Dr. Ramkrishnan R., Scientist-C, Shri K. Muniasamy, PT & GI, and Dr. Md. Rafi Hussain, LIA, for their helping hands.

Specials thanks to our parents whose love, understanding and unwavering belief in our abilities have been a constant source of strength and inspiration.

Lastly, we would like to express our gratitude to all the mates and supporting people we met at CASFOS. Thank you everyone for being a part of this journey of two years.

With heartfelt appreciation,

Anirudh and Anurag

What is your age???

This is the question, we face on the regular basis, but do we actually know the answer? Is it 30-years-old? or 70-years-old?

The answer is quite tricky and has two aspects of it. If we go back in time about billions of years ago, we could probably get a clear answer.

Just after "**The Big Bang**", when the universe came into existence from nothingness or we can say that the energy converted into mass during and after the Big Bang, the very first element which came into existence was Hydrogen atom(H) with only a single proton. Noting that even today around 75 percent of the matter of our universe is made of Hydrogen atoms.

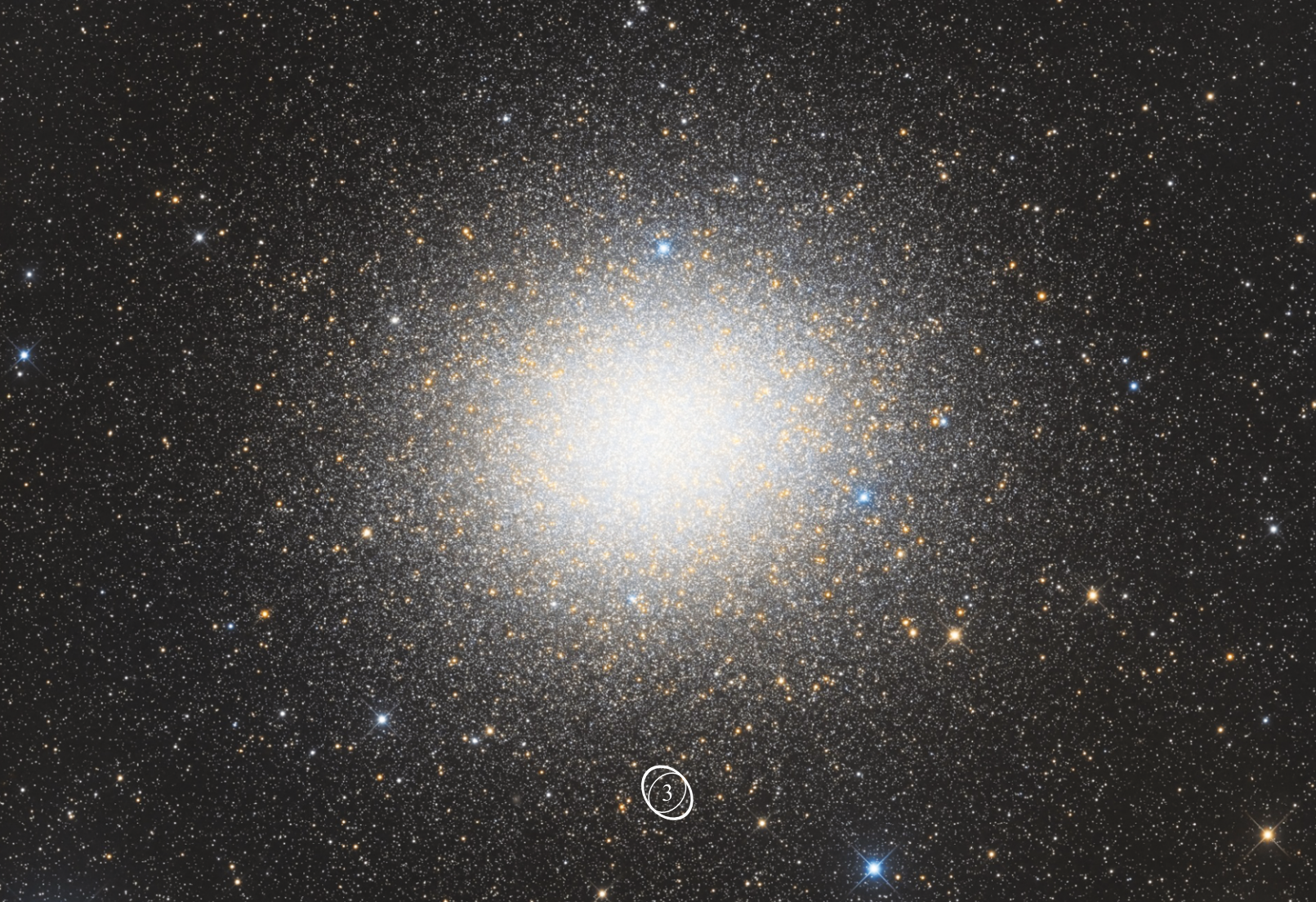
THE BIG BANG

FIRST STARS
(50-150 million years)

**THE SOLAR
SYSTEM
APPEARS**
(9 billion years)

Galaxies form



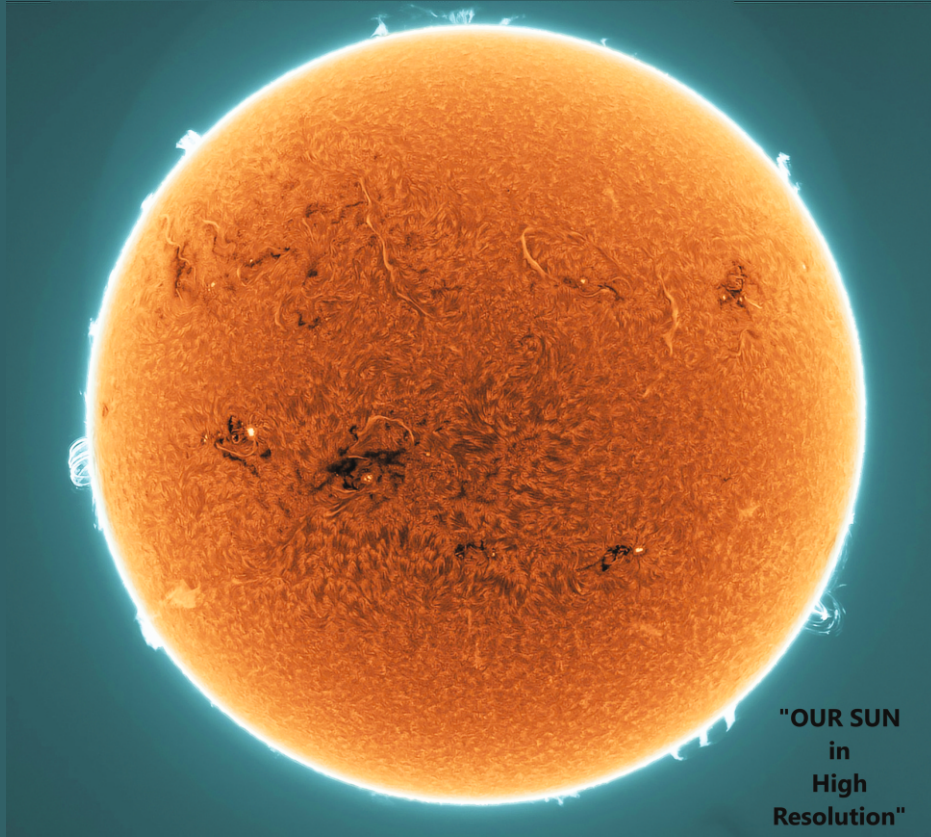


One might be thinking that why I am talking about Big Bang and Hydrogen atom (H), when one's age is concerned?

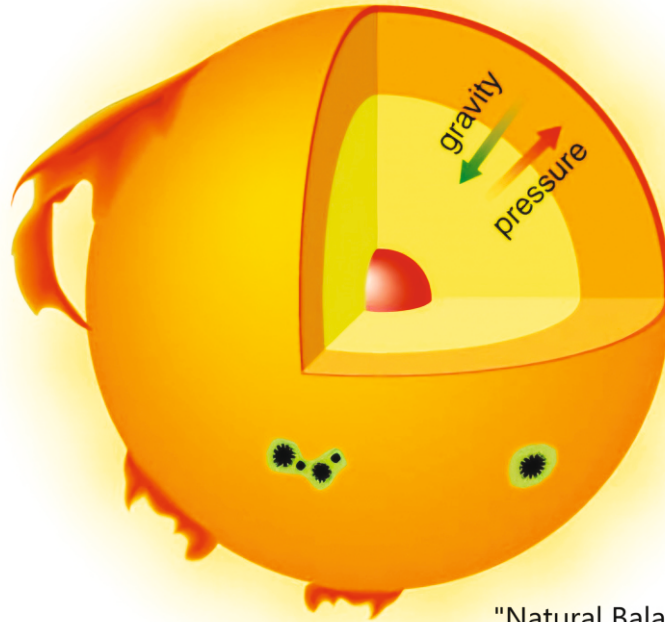
The answer lies in the story of Hydrogen (H) atom itself. All the naturally known elements (118 in number) on our planet Earth are made from Hydrogen (H) atoms! Although this would have taken Billions of years in this process. After the Big Bang, matter mostly Hydrogen atoms condensed and cool down under the influence of gravity thus formed clouds of Hydrogen atom in space.

Matter collected, began to rotate and when particles came very near to each other they condense and got heated up. Huge gravitational pressure and temperature ignites a process of nuclei merger, which we called "Nuclear Fusion".

This is a process by which Hydrogen nuclei are fused together to form a new element Helium (He) with two protons and two neutrons. When this process continued then a Star was born with a nuclear furnace in its core and this furnace's temperature could go to millions of degrees Celsius. Noting that our Sun is also a huge star powered by Nuclear Fusion in its core. It is an astounding fact that our Sun is a stable star and has an age of 4.5 billion years and at this time it is fusing 'H' nuclei into 'He' nuclei in its core, more interestingly Sun has enough fusion material to shine for next 4.5 billion years more. Sun is producing 3.6×10^{26} Joules /second, which is around 100 times more than yearly consumption of all humans on earth! A star is a beautiful example of Nature's balance and symmetry. In a star, the inward gravitational pull is balance by the outward pressure of Nuclear Energy produced in the core.



"OUR SUN
in
High
Resolution"

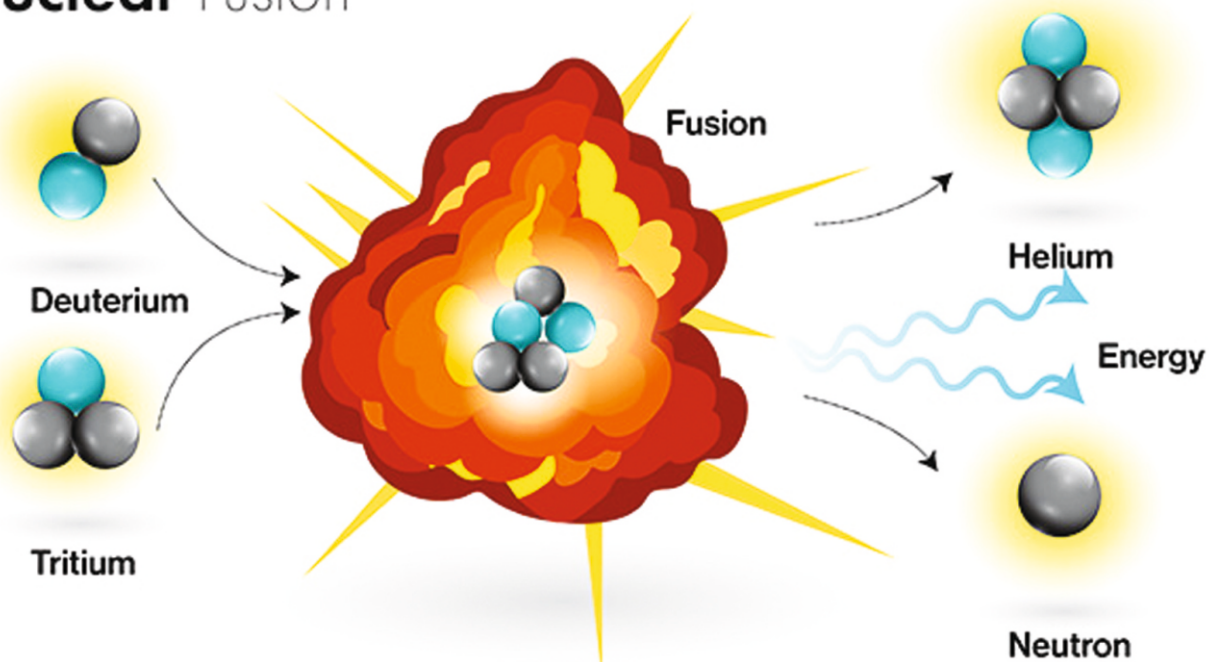


"Natural Balance of a
Stable Star"

As the age of star gets more and more, Hydrogen nuclei inside the star's core fuse to form Helium atoms and depleting Hydrogen nuclei would lower down core's temperature a bit and quantity of Helium nuclei would increases.

Now at this stage, gravity plays a vital role of crushing core further, as a result 'He' nuclei come more closer to each other, this would result in increasing the temperature to a level where Helium nuclei fusion starts, noting that Temperature at which Helium nuclei fusion starts is much more that the Temperature at which Hydrogen nuclei fuses. As the nuclei become large and large, more difficult it would be to fuse them because of Electrostatic Repulsive force between them, to overcome this force very high temperature is required.

Nuclear Fusion



Nuclear Fusion

Helium nuclei fusion in the core produces very vital elements for the existence of the life which includes Carbon(C) and Oxygen (O). Further after some time complex fusion reactions in the star's core and area surrounded by the core, would produce Neon (Ne), Silicon (Si), Phosphorus (P) and Sulphur(S) and other elements. All these elements are very essential for formation of Preliminary Organic molecules to the most complex life we see on Earth today.

Finally, there comes a stage where the star's core finally fuses to form Iron (Fe-56) nuclei. Iron (Fe-56) nuclei is highly stable and will not further fuse irrespective of any core temperature. At this stage all types of the fusion reactions in the Star stops and Star begins to die. Dying star will have one last cry, which is most spectacular event of our universe, a Supernova Explosion.

This phenomenon also called “Core Collapse”, this would result in formation of “Neutron star” or “Black Hole”.

Any Large star which begins to crush under its own weight and Iron core would be crushed under its own mass, If the Mass of Iron core is greater than or equal to $1.44M_{\odot}$ ($M_{\odot}$ is mass of our Sun), then star's core converted into a black hole or Neutron star as defined by Chandrasekhar limit. This limit was given by Subrahmanyan Chandrasekharan Indian origin American theoretical physicist got Nobel prize for his contribution in field of Cosmology in 1983.

Within billionth of second after formation of black hole an outward force will fling all the outer layers of star into the vast universe, with a very bright light is called Supernova explosion and Stardust forms called Nebula. Nebulae can have varied colours depending upon there atomic and molecular composition.

Supernova explosions are very rare events of our Galaxy which is Milky Way, one could see only 1 or 2 supernova explosions in a complete century if he or she is lucky enough, and some supernovas are so bright that one can see them with naked eyes in a full daylight. Interestingly a Supernova explosion emit energy in span of nano seconds which our Sun would produce in its whole life.

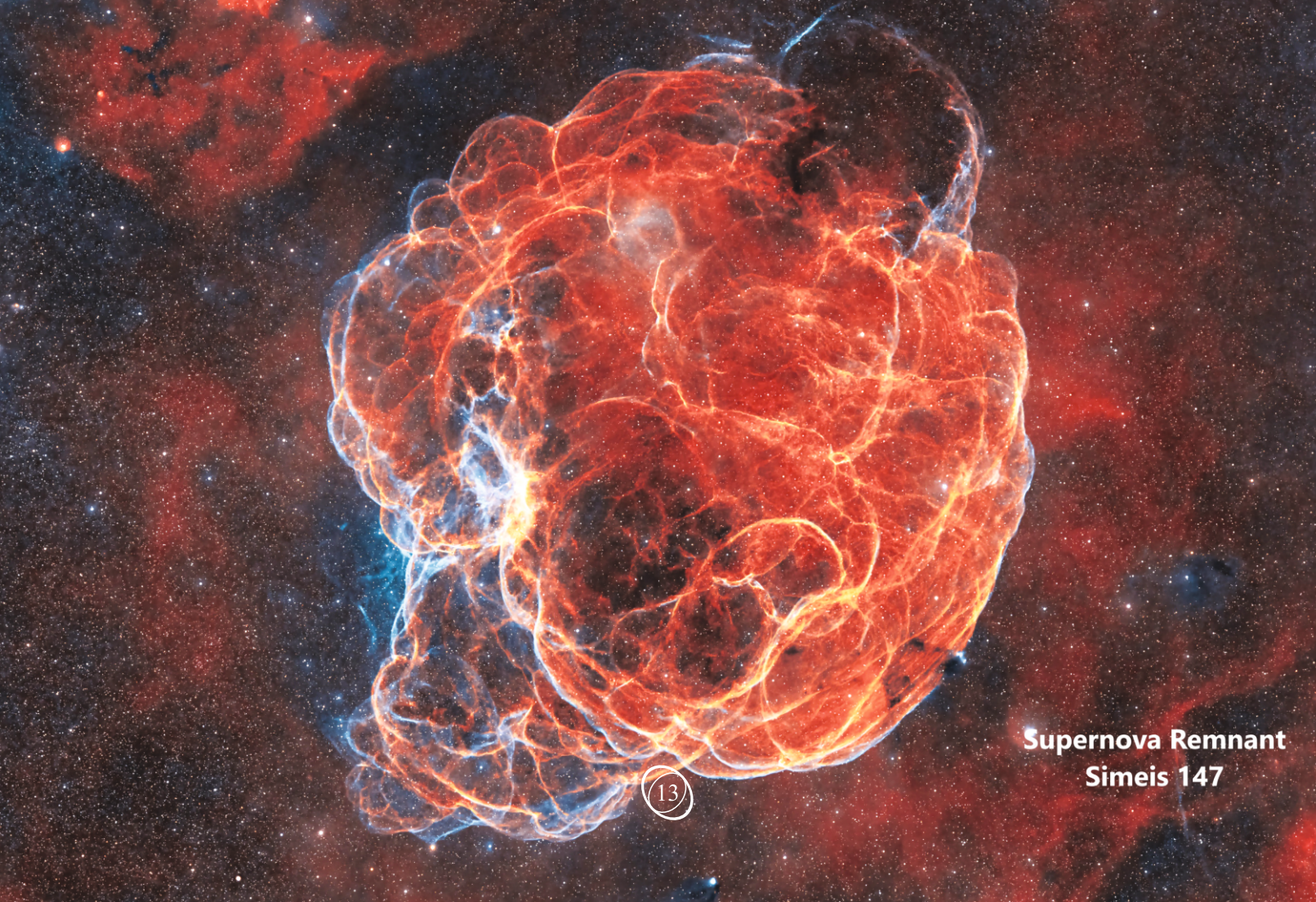
Supernovae are a major source of elements in the interstellar medium from Oxygen through to Rubidium, though the theoretical abundances of the elements produced or seen in the spectra varies significantly depending on the various supernovae. Supernovae are primary source of very high energy Cosmic rays falling on Earth from outer space, luckily Earth has not experience supernova explosion very near to it, or otherwise it would have been vaporized in a Nano second.



12

*"Cygnus Nebula
after Supernova
Explosion"*

© Abdullah Al-H



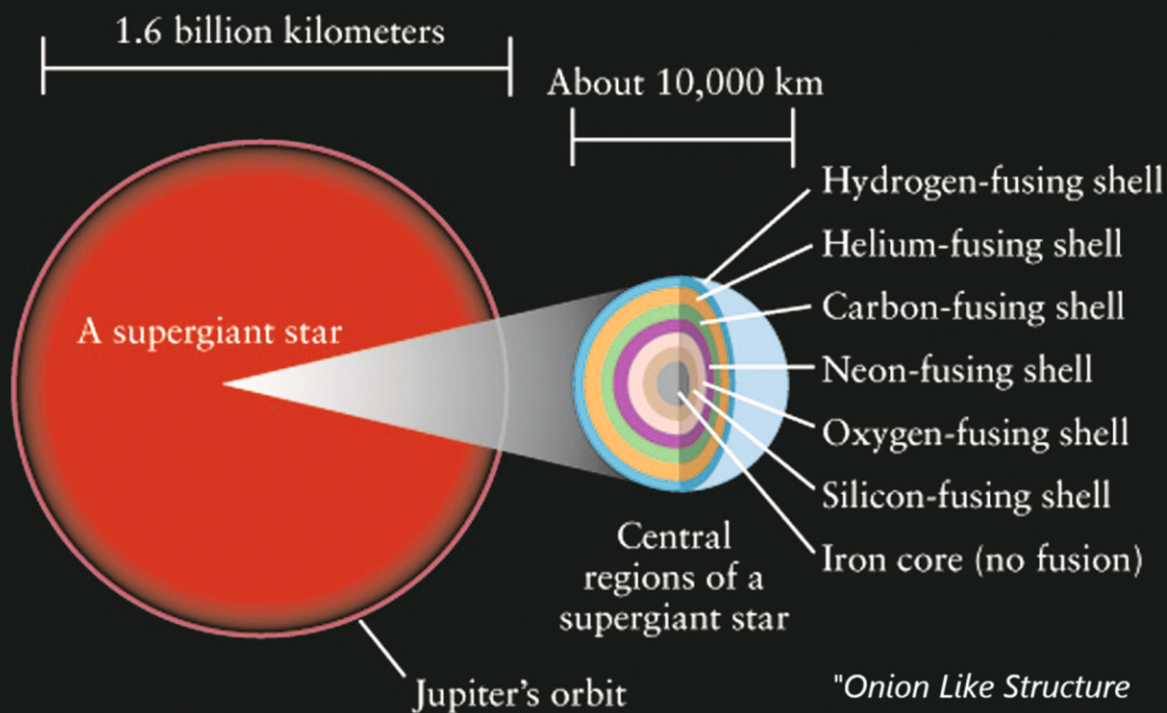
**Supernova Remnant
Simeis 147**

Supernova explosion results in releases of matter which is formed by the process **Stellar Nucleosynthesis** and which are vital for any kind of life which could exist in our Universe. These vital elements are Nitrogen(N), Carbon(C), Oxygen(O), Silicon (Si), Sulphur(S), Sodium (Na), Phosphorus(P), Chlorine (Cl), Magnesium (Mg), Iron (Fe), and other heavy element like Gold (Au), Silver (Ag), Mercury (Hg), Uranium(U), Plutonium (Pu), Lead (Pb), Rubidium(Ru) etc, as the time passes with the effect of gravity, Nebula cools down and start rotating around a central heavy object forming a circular disc where central heavy object again reignites and act as an energy source whereas surrounding material form **Planets, Satellites, Rocky asteroids, Comets or Exo planets** etc. That is how our Solar system was formed around 4.5 billion years ago. Here we can see a circle gets completed a large star burst remnants would produce a small star, although it would take millions of years.

This is how dead star ashes again produce a system of objects which would harbour life! Just like a Phoenix is reborn from its own ashes.

The very first molecule found by NASA's Hubble Telescope was Methane (CH_4), which under the right circumstances can play a key role in prebiotic chemistry -- the chemical reactions considered necessary to form life as we know it. In addition to that others simpler organic bond like CH , CH^+ and CN also detected and are building blocks of Amino acids which is in turn building block of **Protein**.

Saturated complex organic molecules such as CH_3OH , CH_3OCH_3 and $\text{C}_2\text{H}_5\text{CN}$ are commonly seen in high abundances toward warm star-forming regions.



When each and every condition supports, then formation of habitable planet like Earth forms and life flourish on it, which is indeed a rarest of rare event. For example, if the distance of Earth from Sun is 10% less then Earth would have been like a charred fire ball with no trace of life on it, or if the distance between Earth and Sun would have been 10% more then there would exist an ice age in which life would have been buried under 100 feet snow.

Earth is at precise distance from Sun which is essential for life to exist, not more not less. It's indeed a miracle!!!

There might be Millions and Billions of Habitable planets in our Universe but there whereabouts, we don't know now and we might never know because of Universe's vastness. Even if we know about any such habitable Planet, Dwarf planet or Exo planet, humans may not reach there in their lifetime because of Astronomical distances between us and we cannot cruise with speed of light.

Until those time comes, “**Earth**” our blue planet is the only habitable planet we know. Saving and protecting it is in our hands, it should be always kept in mind that water on Earth is much more precious than diamonds when whole Universe is concerned, Probability of finding diamonds on any planet is much more than finding water on it.

Taking example of our planet Earth, it takes millions of years for the formation of atmosphere, which consist of gases like Nitrogen, Oxygen, Carbon dioxide, Methane, and other hydrocarbons. As the time passes by, seasons forms on the Earth, making all the basic molecules in a closed circulation, It starts with formation of basic, organic molecules from Carbon, Nitrogen, Oxygen, Sulphur, Phosphorus, etc, Suitable atmosphere leads to formation of DNA and RNA in prokaryotic cell for the simplest form ever discovered on Earth, gradually Bacteria, Fungi, and other plant capable of executing Photosynthesis process were developed.

The very first form created on Earth was Marine life. These were **Arthropods and Crustacean**, after millions of years these led to formation of big Fishes, Amphibians and Reptiles

Further down the time line, Earthwitness's age of Dinosaurs, they were largest Marine, Amphibians and Terrestrial animals ever lived.

But Nature always has its own plan, a powerful asteroid impact wiped out entire population of Dinosaurs from the face of the Earth. Only small number of, marine, amphibians and terrestrial animals survived that powerful impact. These Animals and Plants undergo **Ecological succession** and different Animals and Plant kingdoms were formed.

Humans came to existence at the terminal age of development and is the most intelligent species of all which is intelligent and cerebrum capacity. Humans from ancient ages had great knowledge and interest in Astronomy, proof of this found in many religious scriptures, mentions of constellations, and planets of solar system would tell us that space intrigues humans since long time

This interest led man to made Spaceships, Complex telescopes and Precision instruments which uncovered the mysteries of universe. Today we know a lot about universe and many things are yet to be known, many may even shock all of us!!!



**"Time Spiral
showing
Different stages
of Evolution of
life on Earth"**

This is how life evolved on Earth. There is certain type of divinity behind whole journey from Hydrogen atom to Earth formation. If Gravity would have been slightly more powerful, whole system would have collapsed, if Gravity would have been slightly less powerful, whole system would have flung apart and nothing would have been existed. So, Gravity exists precisely as it needs to be, all things are at their own place and working smoothly.

If someone is religious, this phenomenon is creation of Almighty God and for Non-religious people it is just a force of nature, but either way whole process is miraculous and extremely difficult to contemplate.

Now coming back to our main question, **what is your age?** So final Answer is all Humans, Animals, Plants, living things and Non-living things, areas old as our own Universe which is billions of years. Each atom in your body is billions of years old, we acquired our body on this Earth, we grow and when we die our body again dissociates into molecules and again combine to form a new life. This is a perpetual cycle which goes on and on for eternity. **This perpetual Construction and Destruction is also true for our entire Universe.**

Philosophically we can say that your body and all the things you ever wanted and get in life, will eventually go to someone else after you are long gone. Even you're not the permanent owner of your own body or infact anything you own is a transferable commodity, and temporary gifts to be cherished.

BHAGWAD GEETA SYAS: Chapter- 2, Verse -22

वासांसि जीर्णानि यथा विहाय नवानि गृह्णाति नरोऽपराणि ।
तथा शरीराणि विहाय जीर्णा न्यन्यानि संयाति नवानि देही ॥22 ॥

Which means: As a person sheds worn-out garments and wears new ones, likewise, at the time of death, the soul casts off its worn-out body and enters a new one.

So, what is the meaning of “Age” then?

It just signifies your Consciousness, if you are born in 1999, then in 2024, your consciousness is 25 years old, but your body and its atoms and molecules were made billions of years ago long before anyone could have existed or contemplated, and that too from a very simple Hydrogen atom!!

If we think in a broader sense, we will be astonished by the fact that how everything has been precisely designed and working smoothly and perpetually, there must be a Governing power behind all this drama, which is taking care of all, it is personal belief that there is a supreme power which is controlling each and every action in this Universe.

BHAGWAD GEETA SYAS: Chapter- 2, Verse -23 and 24

नैनं छिन्दन्ति शस्त्राणि नैनं दहति पावकः ।

न चैनं क्लेदयन्त्यापो न शोषयति मारुतः ॥

अच्छेद्योऽयमदाह्योऽयमक्लेद्योऽशोष्य एव च ।

नित्यः सर्वगतः स्थाणुरचलोऽयं सनातनः ॥

Which means: No weapon can cut the soul into pieces, nor can it be burned by fire, nor moistened by water, nor withered by the wind. It is everlasting, in all places, unalterable, immutable, and primordial the soul is Immortal.

“LIVE Happy, LAUGH Loud, and LOVE Souls”

AS YOU ARE IMMORTAL!!!!!!

