

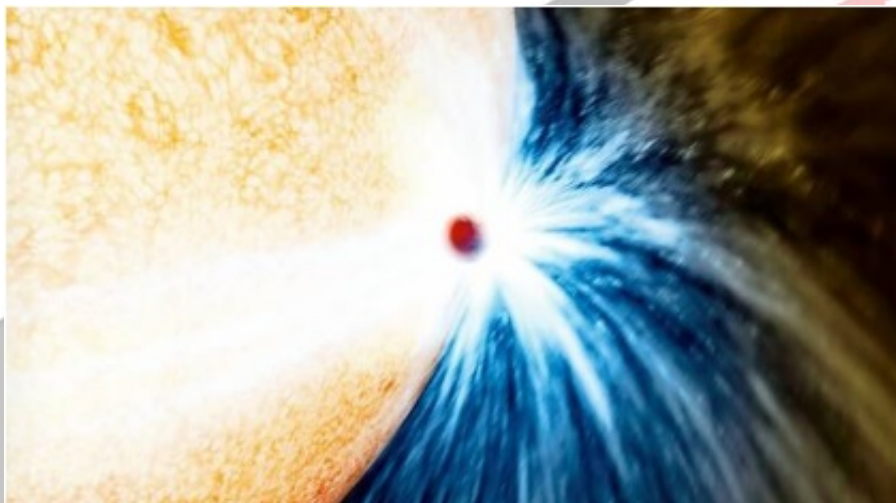


Star Engulfing Jupiter-Sized Planet

Why in News?

According to a recent study, scientists have observed a bloated **Sun-like star, identified as ZTF SLRN-2020**, swallowing a Jupiter-sized planet, causing the star to expel some material into space in an energetic belch.

- The researchers used the **Zwicky Transient Facility (ZTF)** at Caltech's Palomar Observatory to spot the star rapidly become 100 times brighter, then figured out why this happened.



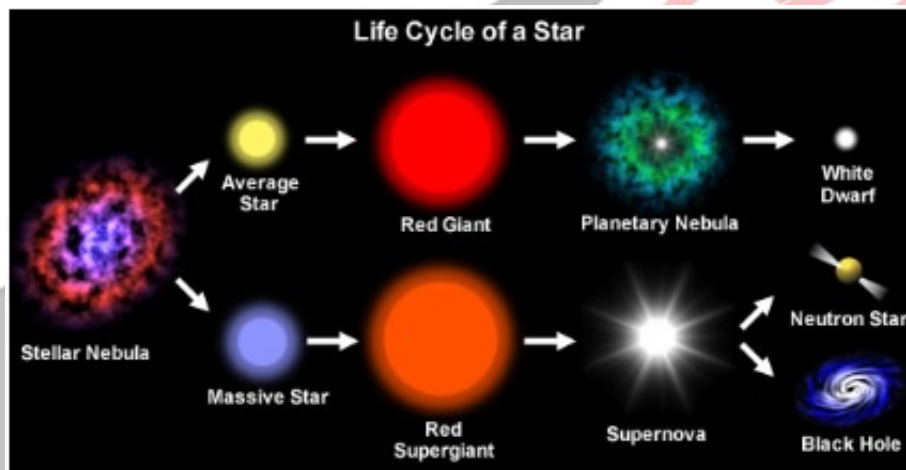
What are the Findings of the Study?

- **Star:**
 - The star is similar to our sun in size and composition and is located in our [Milky Way galaxy](#) about **12,000 light-years** from Earth in the **direction of the constellation Aquila**.
 - A light year is the distance light travels in a year, 5.9 trillion miles (9.5 trillion km).
 - The star is around 10 billion years old, twice as old as the sun.
 - The constellation Aquila, the eagle, is visible in the northern hemisphere from July through October. It is a mid-sized constellation, spanning 652 square degrees of the sky.
 - The star is in the **early stages of the red giant phase**, which means that it was bloated in its old age and **had depleted hydrogen fuel in its core**, causing its dimensions to expand.
 - Red giant stars can swell to a hundred times their original diameter, engulfing **any planets in their way**.
 - Mercury, Venus and finally Earth, our solar system's three innermost planets, will meet this destiny as the sun evolves through its **red giant phase in about 5 billion years**.
- **Star Engulfing the Planet:**

- As the star grew, the planet's orbit brought it too close, and it started getting pulled into the **star's atmosphere**. The closer it got, the faster it was pulled in, **causing it to plunge into the star suddenly**, creating the emission of intense radiation.

What is the Life Cycle of a Star?

- **Birth:** A star's life cycle begins with a [Nebula](#), where gravity pulls gas and dust together to form a protostar.
 - **Nebulae** are huge clouds of gas and dust.
- **Main Sequence Stage:** When the core **gets hot enough**, [Nuclear Fusion](#) starts, and the star enters the main sequence stage.
 - During the main sequence stage, the **star burns hydrogen in its core, producing energy that keeps the star stable** and shining brightly.
 - Smaller stars burn fuel slowly and can shine for billions of years, while massive stars **burn it fast and may only last for hundreds of thousands** of years.
- **Old Age and Death:** As a star's hydrogen runs out, it expands and cools, becoming a red giant. Smaller stars turn into a planetary nebula, **then a [white dwarf](#), and eventually a black dwarf**.
 - More massive stars **explode as a supernova, scattering materials into space**, and leaving behind a neutron star or a [black hole](#).



UPSC Civil Services Examination Previous Year Question (PYQ)

Q. Recently, scientists observed the merger of giant ‘blackholes’ billions of light-years away from the Earth. What is the significance of this observation? (2019)

- ‘Higgs boson particles’ were detected.
- ‘Gravitational waves’ were detected.
- Possibility of inter-galactic space travel through ‘wormhole’ was confirmed.
- It enabled the scientists to understand ‘singularity’.

Ans: (b)

- Every few minutes a pair of black holes smash into each other. These cataclysms release ripples in the fabric of space time known as gravitational waves.
- Gravitational waves are ‘ripples’ in space-time caused by some of the most violent and energetic processes in the Universe. Albert Einstein predicted the existence of gravitational waves in 1916 in his General Theory of Relativity.
- The strongest gravitational waves are produced by catastrophic events such as colliding black holes, the collapse of supernovae, coalescing neutron stars or white dwarf stars, etc.

- Scientists have yet again detected gravitational waves produced by the merger of two light black holes about a billion light-years away from the Earth.
- It was recorded by Laser Interferometer Gravitational-Wave Observatory (LIGO).
- **Therefore, option (b) is the correct answer.**

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