



## News Analysis (22 Jan, 2021)

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### India's Vaccine Diplomacy

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#### Why in News

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India has decided to ship out doses of the **novel coronavirus vaccine to 'neighbouring and key partner countries'**.

The first batches of vaccine have been **already delivered to Bhutan and Maldives** by special planes as a **grant or gift**.

#### India's Coronavirus Vaccines

- Recently, the **Drug Controller General of India (DCGI)** granted the approval for two vaccines - **COVISHIELD** by Serum Institute of India and **COVAXIN** by Bharat Biotech.
  - **COVISHIELD**: It is the name given to an **Oxford-AstraZeneca** Covid-19 vaccine which is technically referred to as **AZD1222** or **ChAdOx 1 nCoV-19**.
  - **COVAXIN**: It is **India's only indigenous Covid-19 vaccine**. This vaccine has been found to be safe and no major side effects are expected.
- Of the two vaccines, **COVAXIN** is an **inactivated vaccine** whereas **COVISHIELD** is a **live vaccine**.

#### Key Points

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- **Vaccine Diplomacy:**

- **Meaning:** Vaccine diplomacy is the **branch of global health diplomacy** in which a nation uses the development or delivery of vaccines to strengthen ties with other nations.
- **Collaborative Effort:** It also includes the joint development of life-saving vaccines and related technologies, with the major actors typically **scientists coming together to work irrespective of the kind of diplomatic relationship** between the participating countries.
- **Benefit for India:** It could provide innovative opportunities to promote India's foreign policy and diplomatic relations between nations in its neighbourhood and across the globe.
  - India had **earlier supplied** hydroxychloroquine, Remdesivir and paracetamol tablets, as well as diagnostic kits, ventilators, masks, gloves and other medical supplies to a large number of countries to help them deal with the pandemic.
  - India has also **carried out capacity building and training workshops** for neighbouring countries.

- **India's Vaccine Diplomacy Plan:**

- Shipments have begun arriving in the **Maldives, Bhutan, Bangladesh and Nepal. Myanmar and the Seychelles** are next in line to get consignments.
- In cases of **Sri Lanka, Afghanistan and Mauritius**, India is awaiting their confirmation of necessary regulatory clearances.
- The **only exception to India's regional vaccine diplomacy would be Pakistan**, which has cleared the AstraZeneca vaccine for use, but has neither requested nor discussed any doses from India yet.

- **Importance of India's Vaccine Diplomacy:**

- **Strategic:**

- **Earning long term goodwill:** By financing shipments from India's assistance programmes for cash-strapped neighbouring countries desperately needing such assistance, India shall earn the long-term goodwill of its immediate neighbours and across Indian ocean countries  
It is in line with **India's neighborhood first initiative**.
- **Advantage over Chinese:** China recently offered its vaccines to Nepal, Afghanistan, Sri Lanka and Bangladesh as it held a **multilateral dialogue** with the four countries and Pakistan on anti-epidemic prevention.  
Early shipment from India in these countries could help counter China's vaccine and mask diplomacy in its neighbourhood.
- **Leverage over western countries:** While the affluent western world, notably the US and Europe, are focused almost exclusively on their own problems, India is being appreciated for helping its neighbours and developing countries, who could not afford US and European vaccines.

- **Economic:**

- **Make India global supply centre:** Beyond India's immediate neighbours, South Korea, Qatar, Bahrain, Saudi Arabia, Morocco and South Africa have all shown inclinations to purchase vaccines from India which is estimated to be 60% of the global supply of inoculants.
- **Boost Pharma Manufacturing in India:** India can become the pharmacy of the world. If Indian vaccines help developing countries to meet their urgent needs, they can become the future long term destination for market expansion of Indian pharmas.
- **Help in reviving the economy:** If India becomes the manufacturing hub to corona vaccines across the world, it shall give a boost to the GDP of India.

- **Rescue from cold war over vaccine:**

The **US-China cold war** has been accused of making distribution of vaccines "political football", which caused the inordinate delay in commencing the inoculation programmes by **WHO**. Thus, early shipment of vaccines by India is seen as a rescue from this bipolar tussle.

- **Earning moral right:**

India's vaccine distribution comes at a time when WHO director-General has criticised moral corruption of drug manufacturers from rich countries for delaying distribution of vaccines and targeting shipments to rich countries only. This could help India have a moral right to have **greater say in international forums**.

- **Disrupts vaccine nationalism:**
  - Vaccine Nationalism is the mechanism through which a country manages to secure doses of vaccines for its own citizens or residents and prioritises its own domestic markets before they are made available in other countries through **pre-purchase agreements** with a vaccine manufacturer.
  - The major drawback of vaccine nationalism is that it puts countries with fewer resources and bargaining power at a disadvantage. India's intervention by making vaccines available to needy countries disrupted the vaccine nationalism.
- **Facilitating global collaboration:**

India vaccines supply could cater greatly to the global collaboration which is being done through the **WHO-backed COVAX Facility mechanism**.

## Way Forward

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**India needs to balance its domestic needs with diplomatic commitments. The vaccination drive in India commenced in January, 2021 is going to be the **World's Largest Vaccination Program**. India has the challenge that while it distributes the vaccine to the world, it should ensure the much needed vaccine supply to those in India who cannot afford it.**

**Source:TH**

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## Governor's Delay on Mercy Petition

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### Why in News

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Recently, the **Solicitor General** told the **Supreme Court (SC)** that Tamil Nadu **Governor** will take a decision in the next three or four days on **mercy petition** of a convict in the 1991 Rajiv Gandhi assassination case.

- The **concept of Mercy Petition is followed in many nations** like the USA, UK, Canada etc. including India.
- In India, the power to grant pardon is entrusted to the President and the Governors of various states under Article 72 and Article 161 of the Constitution. It adds a human touch to the country's judicial process by conferring powers to grant pardon or show Mercy to criminals sentenced to death.

## Key Points

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- **Background:**
  - A **pardon request moved by the convict in 2015** was not considered by the Governor, however, a SC order on a related petition in September 2018 **clarified that the Governor was “deemed fit” to decide on the pardon.**
  - Thereafter a recommendation to remit his life sentence was advised by the Cabinet under **Article 161.**
  - However, the Governor's decision is still pending.
- **Centre’s Stand:**

The pleas for pardon and release should go to the **President** instead of the Governor as the case is being investigated by a central agency.
- **Petitioner's Argument:**
  - A convict was **free to choose between the President and the Governor for pardon.**
  - Referred to the Constitution Bench’s judgment in the *Union of India versus Sriharan 2015*, which said the **“exercise of executive clemency” was “vested in the President or the Governor”.**
  - Centre’s rejection in 2018 of the Tamil Nadu government proposal to remit the sentence of the convicts under **Section 432** of the **Code of Criminal Procedure** (CrPC) did not stop the convicts from separately moving the Governor for pardon under **Article 161.**

**Section 432 of the CrPC:** It lays down that **the appropriate government**, at any time, without conditions or upon any conditions which the person sentenced accepts, **can suspend the execution of his sentence or remit the whole or any part of the punishment to which he has been sentenced.**
- **SC’s Observation:**

The SC termed the Governor’s delay **“extraordinary”**. It also noted how a decision was **not forthcoming despite the State government’s recommendation.**

  - It needs to be noted that **the Governor cannot reject the state’s recommendation but there is no time prescribed to take a decision.**
  - The Governor **had already returned the file to reconsider the government’s decision but the government stood by its decision.**

## Pardoning Power

- **Pardoning Power of the President in India:**

- **About:**

- Under **Article 72 of the Constitution**, the President shall have the power to grant pardons, reprieves, respites or remissions of punishment or to suspend, remit or commute the sentence of any person convicted of any offence where the sentence is a sentence of death.

- **Limitation:**

- The President **cannot exercise his power of pardon independent of the government.**
    - In several cases, the SC has ruled that the **President has to act on the advice of the Council of Ministers** while deciding mercy pleas. These include *Maru Ram vs Union of India in 1980*, and *Dhananjay Chatterjee vs State of West Bengal in 1994*.

- **Reconsideration:**

- Although the President is bound by the Cabinet's advice, **Article 74 (1) empowers him to return it for reconsideration once.** If the Council of Ministers decides against any change, the **President has no option but to accept it.**

- **Governor's Pardoning Power:**

- Article 161:** The Governor of a State shall have the **power to grant pardons, reprieves, respites or remissions of punishment or to suspend, remit or commute the sentence** of any person convicted of any offence against any law relating to a matter to which the executive power of the State extends.

- **Difference Between Pardoning Powers of President and Governor:**

- The scope of the **pardoning power of the President under Article 72 is wider than the pardoning power of the Governor under Article 161** which differs in the following two ways:

- **Court Martial:** The **power of the President** to grant pardon **extends in cases where the punishment or sentence is by a Court Martial** but Article 161 **does not provide any such power to the Governor.**
    - **Death sentence:** The **President can grant pardon in all cases** where the sentence given is the sentence of death but the **pardoning power of the Governor does not extend to death sentence cases.**

Source:TH

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## **Question Hour to Resume during Budget Session**

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### **Why in News**

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**Question Hour**, which had been **suspended by the government during the monsoon session**, will resume when Parliament meets **for the budget session**.

The suspension was done in view of the Covid-19 pandemic. The government **had also cancelled the winter session of Parliament** citing a rising number of Covid cases.

## Key Points

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- **Question Hour (Description):**
  - The **first hour of every parliamentary sitting** is slotted for the Question Hour. However, in 2014, the Question Hour was **shifted in the Rajya Sabha** from 11 am to 12 noon.
  - During this one hour, **Members of Parliament (MPs) ask questions to ministers** and hold them accountable for the functioning of their ministries.
  - The **questions can also be asked to the private members** (MPs who are not ministers).
- **Regulation:** It is regulated according to **parliamentary rules**.  
The **presiding officers of the both Houses** (Rajya Sabha and Lok Sabha) are the final authority with respect to the conduct of Question Hour.
- **Types of Questions:** There are **three** kinds of questions asked:
  - **Starred question** (distinguished by an asterisk): This requires an **oral answer** and hence supplementary questions can follow.
  - **Unstarred question:** This requires a written answer and hence, **supplementary questions cannot follow**.
  - **Short notice question:** It is one that is asked by giving a notice of less than ten days. It is answered orally.
- **Frequency:** Question Hour in both Houses is held **on all days** of the session. But there are two days when an **exception** is made.
  - When the **President** addresses MPs from both Houses.  
The President's speech takes place at the beginning of a new Lok Sabha and on the first day of a new Parliament year.
  - On the day the Finance Minister presents the **Budget**.
- **Previous Sessions Without Question Hour:**  
In the past too, the Question Hour has been suspended. They were suspended **during national emergencies**.

- **Importance of Question Hour:**
  - **Parliamentarian right:** Asking of questions is an inherent and unfettered parliamentary right of members.
  - **Holds government accountable:**
    - It is during the Question Hour that the members can ask questions on **every aspect of administration and Governmental activity.**

Government policies in national as well as international spheres come into **sharp focus.**
    - **Like in trials,** during the Question Hour, every Minister has to answer for their acts of **administrative omission and commission.**
  - **Adaptation of policies:** Through the Question Hour, the Government is able to quickly feel the **pulse of the nation** and adapt its policies and actions accordingly.
  - **Appointment of a Commission:** Sometimes questions may lead to the appointment of a Commission, a **Court of Enquiry** or even Legislation when matters raised by Members are of wide public importance.

## Sessions of Parliament

- **Summoning of Parliament:**
  - The summoning of Parliament is specified in **Article 85 of the Constitution.**
  - The **power to convene a session** of Parliament **rests with the government.**

The decision is taken by the **Cabinet Committee on Parliamentary Affairs** which is formalised by the President, in whose name MPs are summoned to meet for a session.
- **Schedule of the Sessions:**
  - India does not have a fixed parliamentary calendar.
  - However, the gap between two sessions of the Parliament cannot exceed 6 months, which means the **Parliament meets at least two times in one year.**
  - By convention (i.e. not provided by the Constitution), Parliament meets for **three sessions** in a year.
    - **Budget session:** The **longest**, Budget Session (1<sup>st</sup> session), starts towards the end of January, and concludes by the end of April or first week of May.

The session has a recess so that Parliamentary Committees can discuss the budgetary proposals.
    - **Monsoon session:** The second session is the three-week Monsoon Session, which usually begins in July and finishes in August.
    - **Winter Session:** It is the third session held from November to December.

**Source: TH**

## Ratle Hydro Electric Project

### Why in News



The Union Cabinet has given its approval for **850 MegaWatt (MW) Ratle hydropower project** on **Chenab river** in Jammu and Kashmir.

## Key Points

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- **About the Ratle Hydroelectric Project:**
  - **Location:** It is a **run-of-the-river hydroelectric** power station **on the Chenab River, Kishtwar district** of the Indian Union Territory of **Jammu and Kashmir**.
  - **Features:** It includes a **133 m tall gravity dam** and **two power stations** adjacent to one another.
    - The installed capacity of both power stations will be **850 MW**.
  - **Background:** In June 2013, the then Indian Prime Minister laid the foundation stone for the dam.
    - Pakistan has frequently alleged** that it violates the **Indus Water Treaty, 1960**.
  - **The Latest Approval:** It envisages an investment of about **Rs. 5282 crore** and the project shall be **commissioned within a span of 60 months**.
- **Pakistan's Objections and Indus Water Treaty:**
  - The Pakistan government in 2013 had objected to the construction of the dam, claiming that it was not in conformity with the **Indus Water Treaty**.
  - In **August 2017**, the **World Bank** allowed **India to construct the dam**.
  - Pakistan has approached the World Bank **with fresh protests**, but the Centre has now **decided to go ahead with the construction**.
    - The **Indus Waters Treaty** was signed in 1960 after **nine years of negotiations** between India and Pakistan **with the help of the World Bank, which is also a signatory**.
    - The Treaty **provides India an absolute control of all the waters of Eastern Rivers** while **Pakistan shall receive for unrestricted use all those waters of the Western Rivers** which **India** is under obligation to let flow beyond the **permitted uses**.
    - The **Ravi, the Beas and the Sutlej** are together called as **Eastern Rivers** while the **Chenab, the Jhelum and the Indus main** are called as **Western Rivers**.

- **Benefits:**
  - **Strategic:**
    - This comes in the backdrop of India's **plan to expedite strategically important hydropower projects** in the union territory post its reorganization, as the government **plans to fully utilize its share of water under the Indus Waters Treaty of 1960.**
    - The task is seen as strategically vital in the context of China developing the controversial **China-Pakistan Economic Corridor (CPEC)**, part of its **One Belt One Road (OBOR)** infrastructure initiative.
  - **Socio-Economic Development:** The construction activities of the Project will result in **direct and indirect employment** to around 4000 persons. Increase in **disposable income** will in turn lead to **socio-economic development** of the region.
  - **Power at Cheaper Rates:** Union Territory of Jammu and Kashmir will be benefitted by getting **free power** worth Rs. 5289 crore.
  - **Surplus Power:** The Power generated from the Project will help in providing **balancing of Grid** and will improve the **power supply position.**
    - Grid balancing involves increasing existing power generating infrastructure to smooth out the supply of power.
  - **Government Revenue:** Through levy of **Water Usage Charges** from Ratle Hydro Electric Project, during project life cycle of **40 years.**
- **Other Projects on Chenab Basin:**
  - **Kiru Hydro Electric (HE) Project:**
    - The Kiru HE Project of 624 MW installed capacity is proposed on river Chenab (Kishtwar district).
  - **Pakal Dul (Drangdhuran) Hydroelectric Project:**
    - It is a reservoir based scheme proposed on river **Marusudar**, the main **right bank tributary of river Chenab** in Kishtwar Tehsil of Doda District in Jammu & Kashmir.
  - **Dulhasti Power Station:**
    - It is run-of-the-river with an installed capacity of 390 MW to harness the hydropower potential of **river Chenab** (Kishtwar district).
  - **Salal Power Station:**
    - It is a run-of-the-river scheme with an installed capacity of 690 MW to harness the Hydropower potential of **river Chenab.** It is located in **Reasi district of Jammu & Kashmir.**

## Chenab River

- **Source:** It rises in the upper Himalayas in the **Lahaul and Spiti district** of **Himachal Pradesh state**.  
The river is formed by the confluence of two rivers, **Chandra and Bhaga**, at **Tandi, 8 km southwest of Keylong**, in the **Lahaul and Spiti district**.
  - The **Bhaga river** originates from **Surya taal lake**, which is situated a few kilometers west of the **Bara-lacha la pass** in Himachal Pradesh.
  - The **Chandra river** originates from **glaciers east of the same pass** (near Chandra Taal).
- **Flows Through:** It flows through the **Jammu region of Jammu and Kashmir into the plains of Punjab, Pakistan, before flowing into the Indus River**.



**Source:PIB**

## Egypt Resumes Severed Relations With Qatar

## Why in News

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Recently, **Egypt resumed the severed diplomatic and economic ties with Qatar.**

Egypt was part of an **Arab quartet** (other members were Saudi Arabia, United Arab Emirates and Bahrain) which had accused Qatar of supporting terrorism and being too close to Iran due to which they had imposed a land, air and naval blockade on Qatar in **2017.**



## Key Points

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- **Reasons for the Reassumption of Ties:**
  - **Solidarity and Stability Deal:**
    - Recently, Gulf states signed a '**solidarity and stability**' deal at the 41<sup>st</sup> **Gulf Cooperation Council (GCC)** summit.
      - **Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and UAE** are the members of GCC.
    - In this summit, members of the GCC removed all the sanctions over Qatar and **reopened their land, sea and air borders** to Qatar.
    - In solidarity with the Arab quartet (whose three members are in GCC), Egypt too resumed its ties with Qatar.
  - **To Unite Against Iran:**
    - Egypt conciliated with Qatar to strengthen the Gulf region against the threats posed by the **Iranian regime's nuclear and ballistic missile programme** which has always been opposed by the USA and GCC members.
  - **Growing Power of Qatar:**
    - Qatar is one of the **world's largest natural gas producers** and among the countries with **the highest per-capita income**, and is also **host of the 2022 Football World Cup**.
    - Under the Government of Mohamad Morsi (2012-13), Qatar was the highest investor in Egypt.
  - **Support from USA:**
    - The United States and Qatar have extensive economic ties. The USA is the largest foreign direct investor and its single largest destination of exports.
    - Due to good mutual relations between Qatar and USA, the USA **mediated the solidarity and stability deal** to unite all the gulf countries against Iran which also triggered Egypt's reconciliation.

- **Reasons For Earlier Discord:**
  - **Ties with Muslim Brotherhood:**
    - Post **Arab spring** and the downfall of Mohamad Morsi (former president of Egypt whom Qatar favoured) regime, Qatar supported Muslim Brotherhood in Egypt to secure its influence within that country as well as domestic support from other Islamist groups.
    - However, the **Muslim brotherhood were outpowered** by the current regime under **Abdel Fattah el-Sisi** which has allegiance with the Arab quartet.
      - Gulf states monarchs and dictators are against the Islamist movements under Muslim Brotherhood because it aims for **political reforms** that might **threaten their regime**.
  - **Independent Foreign Policy Approach:**
    - In the past, Qatar has long been dominated by Saudi Arabia. Since 1995, Qatar initiated an independent foreign policy approach and established friendly relations not only with other countries such as the USA, Europe, Israel and Iran but also with the **Palestinian**, Hamas and the Islamist parties as well.
    - Assumption of such **high-profile roles in regional mediation and cooperation** did not go well with the GCC members and Egypt.
  - **Good Relationship with Iran:**
    - Qatar shares a **huge gas field with Iran**, which is an incentive for it to retain good relations with the Iranian regime.
- **Significance for India:**
  - India has good relationships with Egypt as well as all the GCC states including Qatar. Such reconciliation and rapprochement between countries in the region could expand the opportunities for India.
  - The Gulf region is one of the **biggest markets for Indian goods** and is the most important supplier of hydrocarbons to its economy. Peaceful relationships between these gas and oil reserve rich states are favourable to **catering to the energy needs of India**.
  - The Gulf countries host more than millions of Indian migrants. They are mostly the workers who carry out development activities and they are the prime sources of **remittances** to India.
  - Improved mutual relationships with gulf countries and Egypt could provide employment and investments opportunities for India in areas such as **food processing**, healthcare, education, culture, defence and security.

## UV-Bright Stars Spotted in Globular Structure NGC 2808

### Why in News

Recently, astronomers have spotted rare hot **Ultra Violet (UV)-bright stars** in the **massive intriguing globular cluster** in the **Milky Way Galaxy** called **NGC 2808**.

India's first multi-wavelength space satellite **AstroSat** helped astronomers in this.

## Key Points

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- **Data:**

Scientists combined data of **Ultraviolet Imaging Telescope (on board AstroSat)** with observations made using other space missions such as the **Hubble Space Telescope** and the **Gaia telescope** along with **ground-based optical observations**.

- **Hubble Space Telescope:** The HST or Hubble (**NASA**) is a space telescope that was launched into **Low Earth orbit** in 1990 and remains in operation. It is one of the **largest and most versatile space telescopes** till date.
- **Gaia** is a space observatory of the **European Space Agency**, launched in **2013 and expected to operate until 2022**. The spacecraft is designed for astrometry: measuring the positions, distances and motions of stars with unprecedented precision.

- **Findings:**

- About **34 UV-bright stars** were found to be members of the globular cluster (NGC 2808). One of the UV-bright stars was found to be about **3000 times brighter** than the Sun with a surface temperature of about **1,00,000 K**.
- **Hot UV-bright stars** have been distinguished from the **relatively cooler red giant and main-sequence stars**.
- Most of the stars were found to have evolved from a solar stage called the **horizontal branch stars** with hardly any outer envelope. Thus, they were bound to skip the last major phase of life called the **asymptotic giant phase (it is one of the last major phases in the life of stars)** and directly become dead remnants or white dwarfs.

The **horizontal branch** (HB) is a stage of stellar evolution that immediately follows the **red giant branch** in stars.

- **Significance:**

- **Properties of Stars:** The findings will help in determining properties of these stars such as their surface temperatures, luminosities and radii.
- **Evolution of Stars:** These present **excellent laboratories** where astronomers can understand **how stars evolve through various phases** between their birth and death.

**Death of star:** It is not clear how these stars end their lives as not many of them are detected in these fast-evolving phases, making their study crucial.

- **UV radiations:** UV-bright stars are speculated to be the reason for the ultraviolet radiation coming from old stellar systems.

- **About NGC 2808:**

- NGC 2808 is a **globular cluster in the constellation Carina**. The cluster belongs to the **Milky Way**, and is one of our home galaxy's **most massive clusters**, millions of stars. It is estimated to be 12.5-billion years old.
- It is said to have at least **five generations of stars**.

## Stellar Evolution

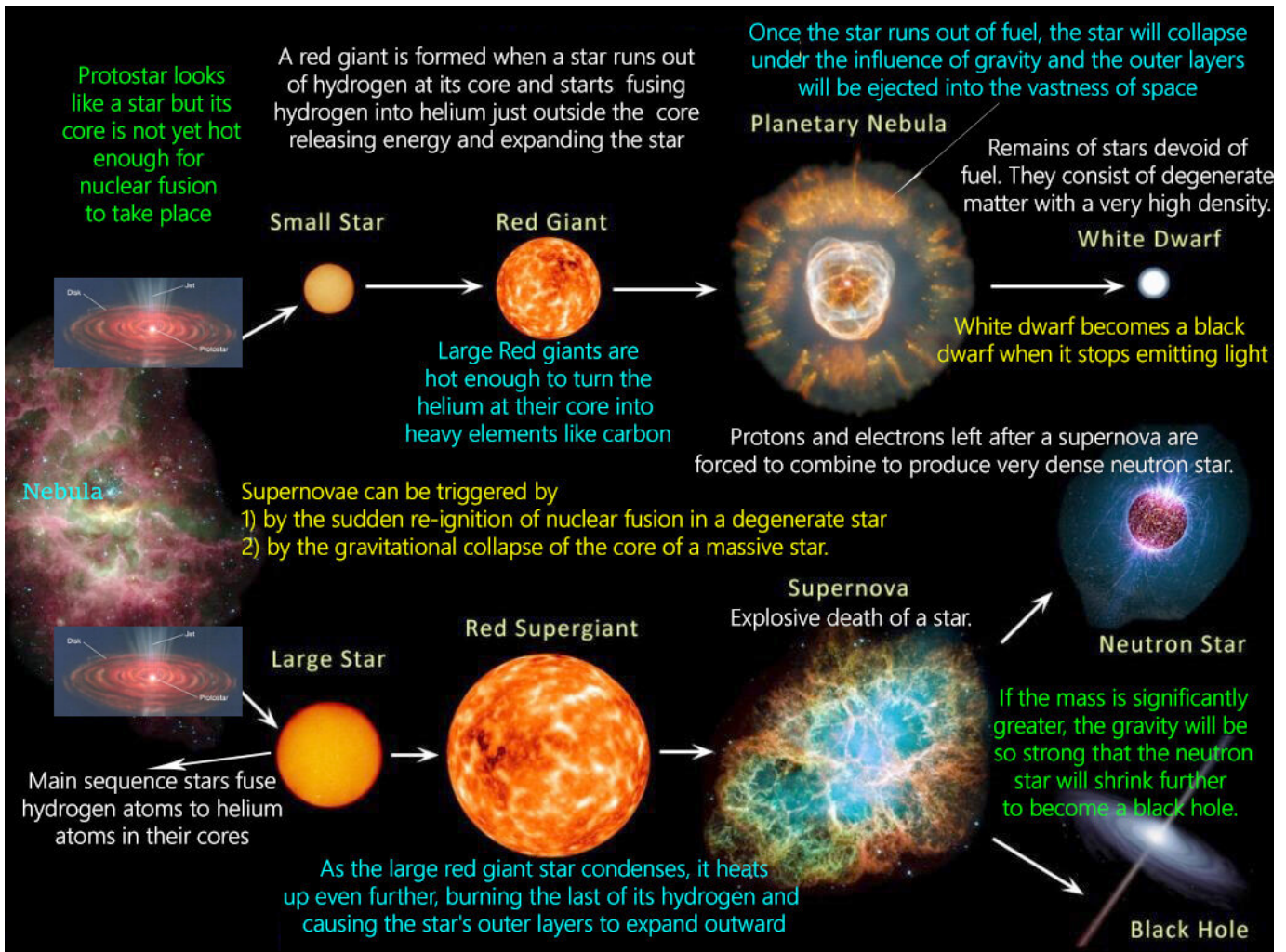
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- **Nebula:**
  - A nebula is a cloud of gas (mostly hydrogen and helium) and dust in space.
  - Nebulae are the birthplaces of stars.
- **Main Sequence Stars:**
  - Main sequence stars are stars that are fusing hydrogen atoms to form helium atoms in their cores.
  - Most of the stars in the universe i.e. about 90% of them are main sequence stars. The **sun** is a main sequence star.
  - Towards the end of its life, a star like the Sun **swells up into a red giant**, before losing its **outer layers** as a **planetary nebula and finally shrinking to become a white dwarf.**
- **Red Dwarf:**
  - The **faintest (less than 1/1000th the brightness of the Sun) main sequence stars** are called the red dwarfs.
  - **Proxima Centauri**, the nearest star to the Sun, is a red dwarf.
- **Red Giant:**
  - Red giants have diameters between 10 and 100 times that of the Sun.
  - They are very bright, although their surface temperature is lower than that of the Sun.
  - A red giant is formed during the **later stages of the evolution as it runs out of hydrogen fuel at its centre.**
  - A very large red giant is often called **Red Supergiant.**
- **Planetary Nebula:**

Planetary nebula is an outer layer of gas and dust that are lost **when the star changes from a red giant to a white dwarf.**
- **White Dwarf:**
  - A white dwarf is a **very small, hot star, the last stage in the life cycle of a star.**
  - White dwarfs are the remains of normal stars, whose nuclear energy supplies **have been used up.**
  - White dwarf consists of degenerate matter with a **very high density** due to gravitational effects.
- **Nova:**
  - Novae occur on the surface of a **white dwarf** in a binary system.
  - If the two stars of the system are sufficiently near to one another, material (hydrogen) can be pulled from the companion star's surface onto the white dwarf.
  - When enough material builds up on the surface of the white dwarf, it triggers a nuclear fusion on a white dwarf which causes a sudden brightening of the star.



- **Supernova:**
  - A supernova is the **explosive death of a star** and often results in the star obtaining the brightness of **100 million suns for a short time**.
  - The extremely luminous burst of radiation expels much or all of a **star's material at a great velocity**, driving a shock wave into the surrounding interstellar medium.
  - These shock waves trigger condensation which is a nebula paving the way for the birth of a new star.
- A **neutron star** is the **collapsed core of a massive supergiant star**.



## AstroSat

- It is a **multi-wavelength astronomy mission** on an IRS-class (Indian Remote Sensing-Class) satellite in a **650-km, near-equatorial orbit**.
- **Launch:** It was launched by the Indian launch vehicle **PSLV** from Satish Dhawan Space Centre, Sriharikota in 2015 by ISRO.
- It is the **first dedicated Indian astronomy mission aimed at studying celestial sources in X-ray, optical and UV spectral bands** simultaneously with its five unique X-ray and ultraviolet telescopes working in tandem.

- One of the unique features of AstroSat mission is that it enables the **simultaneous multi-wavelength observations** of various astronomical objects with a single satellite.
- The Ground Command and Control Centre for ASTROSAT is located at **ISRO Telemetry, Tracking and Command Network (ISTRAC), Bangalore, India.**
- This has put India in an exclusive club of countries which have multi wavelength space observatories.
- The minimum life of the AstroSat mission was expected to be **5 years.**

**Source:PIB**

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## **Alternative Anti-Cancer Therapy**

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### **Why in News**

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An **Innovation in Science Pursuit for Inspired Research (INSPIRE)** faculty from the **Department of Science & Technology (DST)** is working on an **Alternative Anti-Cancer Therapy (Anti-Angiogenic)** using **transgenic zebrafish.**

- **INSPIRE** is an **innovative programme** sponsored and managed by the DST for **attraction of talent to Science** and was launched in 2008.
- **Objective** of INSPIRE is **to communicate to the youth of the country the excitements of creative pursuit of science, attract talent to the study of science** at an early age and thus **build the required critical human resource pool** for strengthening and expanding the Science & Technology system and R&D base.

### **Key Points**

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- **Angiogenesis:**
  - It is the **physiological process** through which **new blood vessels form from pre-existing vessels.**
  - It is **critical in the growth of cancer** because tumors need blood supply to grow. Tumors trigger the growth of blood cells by giving off chemical signals that stimulate angiogenesis.
  - **Inhibition of tumor angiogenesis** has become a popular **anti-cancer strategy** after chemotherapy.

**Angiogenesis inhibitors** are unique cancer-fighting agents because they **block the growth of blood vessels that support tumor growth** rather than blocking the growth of tumor cells themselves.
  - **Limitation of Anti-Angiogenic Drugs:**

The clinically approved **anti-angiogenic drugs** are ineffective due to **parallel activation of various compensatory mechanisms** involving a cascade of molecules, which **aids tumor angiogenesis** and investigation of these mechanisms are essential for developing anti-angiogenic therapies.

- **Alternative Anti-Cancer Therapy:**

- Scientists are exploring an alternative anti-cancer therapy that involves **targeting tumor generated formation of new blood vessels** which **allows the delivery of oxygen and nutrients to the body's tissues**.
- An INSPIRE faculty is exploring the role of **compensatory mechanisms** signaling cues as key targets for cancer therapy.
- He has also found that **nitric oxide (NO)** plays a key role in switching off **angiogenesis** under tumor microenvironment and that the **melatonin hormone** suppresses tumor angiogenesis.
- The research has shown that **compensatory mechanisms could be a potential therapeutic target** for developing effective anti-cancer treatment regimes.



- **Transgenic Zebrafish Platform (TZP):**

- **About:**

The INSPIRE faculty is further working to develop **transgenic zebrafish** (which have exogenous genes added to their genome) model by use of the **CRISPR/Cas9 gene-editing tool** to study the compensatory angiogenesis mechanism in tumor microenvironment.

- **Reason for Using Zebrafish Model:**

It has been selected for the study because of its **rapid development, optically transparent, high yield in offspring, and easy techniques for forward and reverse gene manipulation.**

## Cancer

- **About:**

- It is a **large group of diseases** that can start in almost any organ or tissue of the body when **abnormal cells grow uncontrollably**, go beyond their usual boundaries to invade adjoining parts of the body and/or spread to other organs. The latter process is called **metastasizing** and is a major cause of death from cancer.
- A **neoplasm** and **malignant tumor** are other common names for cancer.
- Lung, prostate, colorectal, stomach and liver cancer are the **most common types of cancer in men**, while breast, colorectal, lung, cervical and thyroid cancer are the **most common among women**.

- **Cancer Burden:**
  - Cancer remains as one of the **leading causes of adult illness and death** due to chronic and **Non-Communicable Diseases (NCD)** world-over including in India.
  - According to the **World Health Organisation (WHO)**, cancer is the second **leading cause of death globally and in 2018**, there were approximately 18 million cases globally, of which 1.5 million were in India alone.
- **Prevention:**

Between 30% and 50% of cancer deaths could be prevented **by modifying or avoiding the key risk factors**. Key risk factors include **tobacco use, alcohol use, diet, exposure to ultraviolet radiation, pollution, chronic infections, etc.**
- **Treatment:**
  - Options include **surgery, cancer medicines and/or radiotherapy**, administered alone or in combination.
  - **Palliative care**, which focuses on improving the quality of life of patients and their families, is an essential component of cancer care.

**Source:PIB**

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