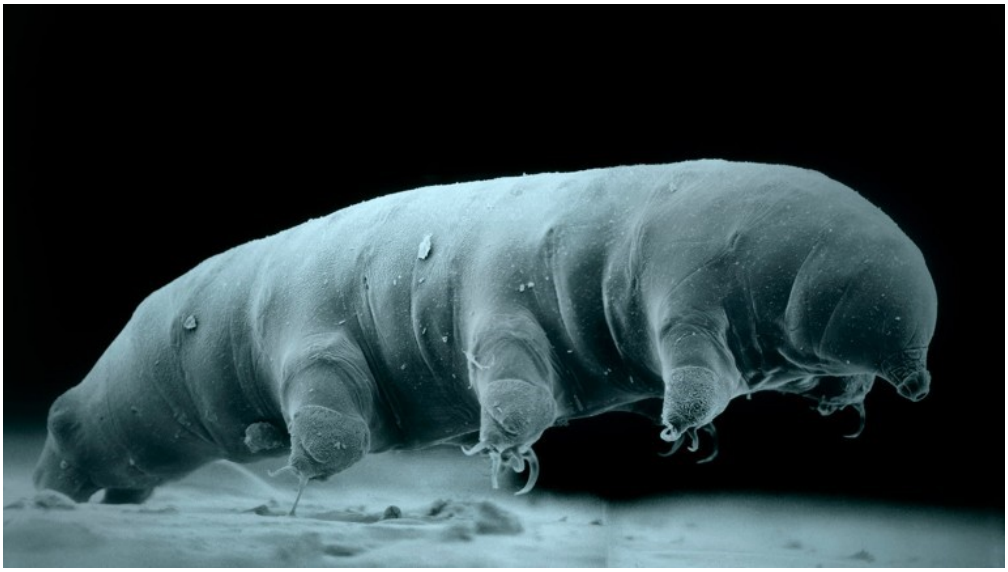
UPSC Daily Current Affairs | Prelim Bits 28-10-2024

A Study on Hypsibius henanensis

A team of researchers has recently identified that the genetic mechanisms help a newly discovered species of tardigrades (Hypsibius henanensis) withstand high levels of radiation.

- **Recent Findings -** The team of scientists sequenced the genome of this new species and revealed that it had ***14,701 genes***, 30% of which were unique to tardigrades.
- The scientists discovered 2,801 of the genes in Hypsibius henanensis that were involved in DNA repair.
- They protect the microscopic animals' DNA from damage and repair breaks.
- They then exposed this species to radiation doses of gamma rays that were far beyond what would be survivable for humans.
- More specifically, they found 3 factors that help this species survive radiation.
- **Factors** - The first was its ability to quickly repair double-strand breaks in DNA due to radiation exposure, by using a protein called ***TRID1.***
- The second factor involved a gene that was switched on during exposure to radiation, resulting in the generation of two proteins that are known to be important for mitochondrial synthesis.
- The researchers also estimate that ***0.5–3.1%*** of the tardigrade's genes were acquired from other organisms through a process known as ***horizontal gene transfer.***
- A gene called ***DODA1,*** which seems to have been acquired from bacteria, enables tardigrades to produce four types of antioxidant pigments called betalains.
- These pigments can mop up some of the harmful reactive chemicals that radiation causes to form inside cells, which account for 60–70% of radiation's damaging effects.
- **Applications -** The findings could one day be harnessed to help
    - Protect astronauts from radiation during space missions,
    - Clean up nuclear pollution or improve cancer treatment,
    - Tolerate other harsh conditions, such as extreme temperatures, air deprivation, dehydration and starvation.
    - Improve the shelf life of fragile substances such as vaccines.



Tardigrades
• Tardigrades are short, plump, and covered in a tough cuticle (similar to that of grasshoppers and other insects) that they must shed to grow. • They have four pairs of legs, with 4-6 claws on each foot. • They are also known as water bears or moss piglets. • They live in liquid water, including oceans, freshwater lakes and rivers • Their specialised mouthpart called a ***bucco pharyngeal apparatus*** allows them to suck the nutrients out of plants and other microorganisms. • Their tiny bodies contain no bones and are instead supported by a hydrostatic skeleton a fluid-filled compartment known as a ***hemolymph.*** • They have no spinal cord but do have a similar system in place a ventral nervous system that sends signals between the brain and body. • They often found lurking in mosses and lichens. • Tardigrades don't live in or on humans, and they are not dangerous. • Tardigrades have been known to survive: • Low temperatures of 0.05 kelvins (-272.95 degrees Celsius or functional absolute zero) • High temperatures of 150 degrees Celsius • Pressures of 40,000 kilopascals • The burning ultraviolet radiation of space • Being shot from a high-speed gun (traveling at nearly 3,000 feet per second and the impact of 1.14 gigapascals of pressure) • Being stored in a freezer for 30 years

References

1. Indian Express | Hypsibius henanensis
2. Nature | Hypsibius sp. tardigrade

Umbrella Conservation project

The wildlife wing of the Pune forest department has recently proposed an umbrella conservation project.

- The project covers 5 wild animal species namely wolf, jackal, fox, civet and hyena. Together, these species are called '***Mizo-Carnivorous'.***
- It is a ***species-specific conservation*** approach.
- It has identified the five aforementioned wild animal species in Pune that are under threat and need urgent intervention for conservation.
- **Wolves** - The most endangered population of wolves in Pune.
- **Leopards** - The leopard population is expanding to new areas, causing significant crop and cattle damage.
- **Other animals** - Other wild animals in Pune are threatened by habitat destruction, conflict with stray dogs, and diseases.
- This project will be implemented in 3 phases.
- The first phase will begin with data collection regarding the animal population and identifying the area they are living in. This also includes areas outside the protected forest.
- The later stage will include threat analysis and mitigation measures.
- The conservation plan has been submitted to the forest head office, and it is under consideration by the chief wildlife warden.
- **Threats to these animals -** Habitat destruction due to expansion of agriculture in grasslands, infrastructure projects.

Reference

Hindustan Times | Umbrella conservation project

Livestock census

The Union Minister of Fisheries, Animal Husbandry and Dairying recently launched the 21st Livestock Census in New Delhi.

- The census carries out a headcount of the number of domesticated ***animals, poultry, and stray animals*** in the country.
- **Duration** - Conducted ***every 5 years.***
- Since 1919, a total of 20 livestock censuses have been carried out so far, with the last being conducted in 2019.
- The census takes into account information about the species, breed, age, sex, and ownership status of the animals.

Livestock Census, 2024

- **Animals counted in the 21st census** – 16 animal species will be collected.
- These include cattle, buffalo, mithun, yak, sheep, goat, pig, camel, horse, ponies, mule, donkey, dog, rabbit, and elephant.
- In total, the census will capture information on 219 indigenous breeds of these 16 species recognized by ICAR-National Bureau of Animal Genetic Resources (NBAGR).
- Besides these, the census will also carry out a headcount of poultry birds such as fowl, chicken, duck, turkey, geese, quail, ostrich, and emu.

- The census this time will be fully digitized, like the last one in 2019.
- The 21st census will capture several new data points. These include:
- **Data on pastoral animals, pastoralists** - The census will, for the first time, collect data on the contribution of pastoralists to the livestock sector, their socio-economic status, and livestock holding.
- **More details, granular information** - The census will find out the proportion of households whose major income comes from the livestock sector.
- It will also contain data on the gender of stray cattle.
- **Significance -** In terms of productivity, especially in the agriculture sector, poultry and animal husbandry contributes to roughly 30% of the Gross Value Added (GVA).
- In the economy overall, the livestock sector's GVA stands at roughly 4.7%. For comparison, the whole agriculture sector contributes to a GVA of roughly 15%.

  GVA refers to the total output of a sector minus the cost of intermediate consumption.

- The Livestock Census will provide data pertaining to Goal 2 (Zero Hunger), and Target 2.5 (to maintain genetic diversity in food and nutrition), specifically Indicator 2.5.2 (The percentage of local livestock breeds that are at risk of extinction) of the SDGs.

Reference

Indian Express | Livestock census

Hasdeo Arand Forest

The Hasdeo forest in Chhattisgarh saw villagers clash with the police recently, after tree-felling for mining of coal resumed in the green belt.

- The Hasdeo Arand is referred to as the ***"lungs of Chhattisgarh",*** with a wealth of biodiversity.
- According to the Indian Council of Forestry Research and Education (ICFRE), Hasdeo Arand is the ***largest un-fragmented forests in Central India***.
- It consists of pristine Sal (Shorea robusta) and teak forests.
- The forest is the catchment of the ***Hasdeo River***, the Mahanadi's largest tributary.
- It is also the watershed for the ***Hasdeo Bango reservoir***, which irrigates 300,000 hectares of land in Chhattisgarh.
- It is a noted migratory corridor and has a significant presence of elephants.



- **Hasdeo-Arand Coalfield (HAC)** – It covers an area of 1,879.6 sqkm, spanning 3 districts of Sarguja, Korba and Surajpur, in the northern tribal belt of Chhattisgarh.
- As per a 2021 report by the Wildlife Institute of India (WII), 9 species in HAC have special protection under ***schedule I of the Wildlife Protection Act, 1972.***
- These include Elephant, Leopard, Sloth Bear, Indian Grey Wolf, Honey Badger, Four-Horned Antelope, Indian Pangolin, Giant squirrel, and Rusty spotted cat.
- There are 92 species of birds in Hasdeo and 25 different mammals, 16 types of snakes.
- According to the ICFRE in 2021, there are 640 floral species, 128 medicinal plants and 40 timber-yielding species of plants.
- It is also a habitat as well as a corridor for elephants and a corridor for tigers.
- The forest is home to Adivasi communities such as ***the Gonds,*** who have been stewards of the environment for eons.

Reference

Indian Express | Hasdeo Arand Mining Issue

Triton Island

Recent satellite imagery reveals a significant military buildup on Triton Island, the closest landmass in the disputed Paracels archipelago to Vietnam.

- Triton Island is a small island in the South China Sea that is part of the ***Paracel Islands*** chain.
- It's located on the southwest corner of Triton Reef.
- The island is claimed by multiple countries, including China, Vietnam, and Taiwan.
- The island is administered by the People's Republic of China.
- Its location in a contested area increases tensions among these nations.
- The surrounding waters are believed to be rich in oil and natural gas reserves.
- The waters around Triton Island are also important fishing grounds.
- Due to its strategic position in the South China Sea, Triton Island can serve as a military outpost, impacting regional security dynamics.
- The South China Sea is a crucial shipping route for global trade, making control over islands and features in the area significant for maritime security.



Reference

[Eurasian Times | Triton Island]

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