Uranium ISOTOPE

- While studying the atoms of heavy elements, physicists in Japan discovered a previously unknown isotope of uranium, with atomic number 92 and mass number 241, i.e. uranium-241.
- "The discovery of a new neutron -rich uranium isotope is the first since 1979,"
- "In general, an atom's mass is slightly lower than the sum of the masses of protons, neutrons, and electrons,"
- Systematically measuring the mass of "uranium and its neighborhood elements yields essential nuclear information to understand the synthesis of such heavy elements in explosive astronomical events.

What is magic no Nucleus??

- Physicists refer to the number of protons or neutrons in a full shell as "magic" numbers, with numbers 2, 8, 20, 28, 50, 82, and 126 widely recognized as being "magic" numbers. The number of protons and neutrons also determines the size of an atom's nucleus, called its charge radius.
- In nuclear physics, a magic number is a number of nucleons such that they are arranged into complete shells within the atomic nucleus.

THE HINDU

New Level of Reproduction

- Male yellow crazy ants (Anoplolepis gracilipes) are chimeras of two separate genetic lineages, researchers report in a study (Science) that reveals a unique mode of reproduction in this species one previously unknown to science.
- While most multicellular organisms develop from a single-cell zygote into a collection of genetically identical cells a hallmark of biological inheritance the new findings show that male yellow crazy ants are composed of haploid cells with two distinct genetic compositions.
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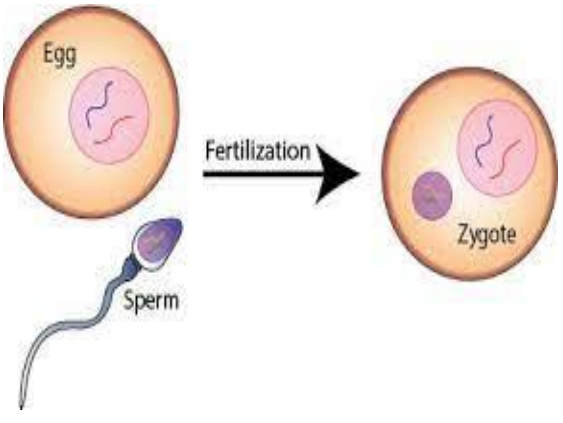
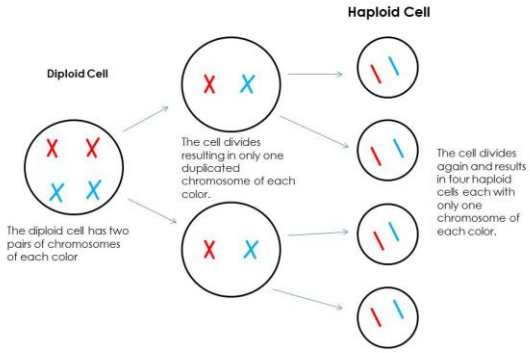
- 

What are haploid cells?



- Haploid refers to the presence of a single set of chromosomes in an organism's cells.
- Sexually reproducing organisms are diploid (having two sets of chromosomes, one from each parent). In humans, only the egg and sperm cells are haploid.

THE HINDU

Pelican

- The island of Sriharikota serves as a barrier that shields a brackish water lagoon that we call the Pulicat Lake.
- Being mostly off -limits to tourists because it is an ISRO launch site, this area is teeming with 76 species of water birds. The lake itself has an average depth of only one meter, although it is nearly 60 km long.
- Pulicat Lake is the second-largest brackish water lagoon in India, measuring 759 square kilometers.

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THE HINDU

Dengue Evolution in India

- While the first infection with any of the four dengue serotypes can prevent reinfection by the same serotype for a long period, the second infection by a different serotype can have a very high viral load and cause severe disease.
- This is because the cross-protection offered by the first infection acts as a shield against other serotypes only

for two- three years and then begins to drop.

- While the antibodies are not able to neutralize the virus belonging to different serotypes, the virus is better able to bind to the antibodies leading to higher cell infection and thus enhanced severity and viral load. This is called the antibody-dependent enhancement mediated by cross-reactive antibodies.
- While the virus that is identical to the one that caused the first infection will be neutralized for a long time, viruses that are a bit look-alike of the serotype that caused the first infection have a greater ability to take advantage of the weakened immune responses and bind to pre-existing antibodies and cause severe disease than the three other serotypes that did not cause the first infection.
- The dominant immune selection pressure has led to the emergence of a unique Indian dengue lineage (DENV-4-Id) belonging to serotype 4 (DENV-4).
- "The DENV-4-Id lineage has diverged away from global sequences,"
- "The DENV-4-Id lineage is dominant in South India, and about 50% of infections in South India are due to this India unique lineage,"
- The E gene, which is seen across the dengue virus exterior, plays an important role in binding to the cell receptors.

THE HINDU

ICE Sheets

- Ice sheets can retreat up to 600 meters a day during periods of climate warming, 20 times faster than the highest rate of retreat previously measured.
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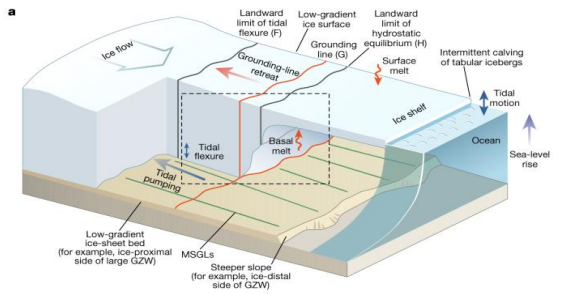
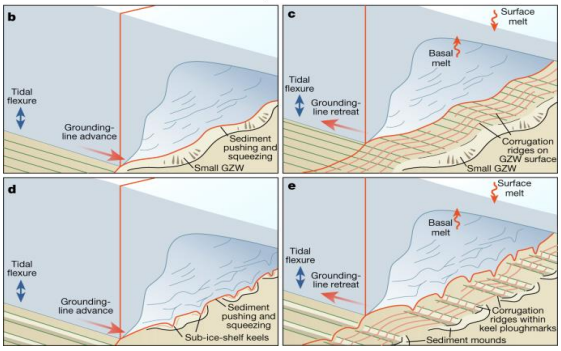
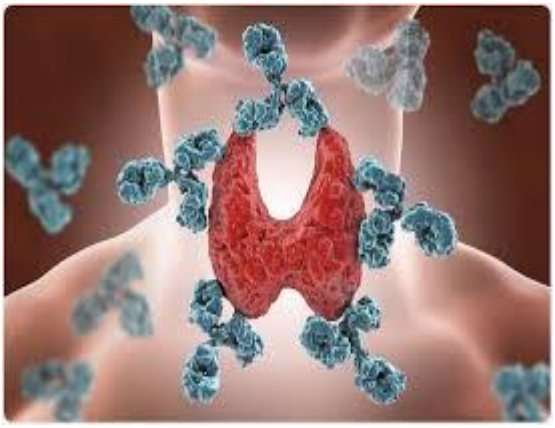




THE HINDU

Autoimmune



What is an autoimmune disease?

- The immune system usually guards against bacteria and viruses. When it senses these foreign invaders, it sends out an army of fighter cells to attack them.
- Usually, the immune system can tell the difference between foreign cells and your own cells.
- In an autoimmune disease, the immune system mistakes parts of your body, like your joints or skin, as foreign. It releases proteins called autoantibodies that attack healthy cells.
- Some autoimmune diseases target only one organ. Type 1 diabetes damages the pancreas. Other diseases, like systemic lupus erythematosus (SLE), or lupus, can affect the whole body.

THE HINDU

PHA Plastic

- A class of polyesters considered a promising alternative to common plastics has now been made more mechanically tough and thermally stable.
- Researchers replaced the reactive hydrogens in the monomer of these materials with polyhydroxyalkanoate (PHA) plastics and found that it enhanced PHA's thermal and mechanical properties and enabled closed-loop chemical recyclability.
- The new approach (Science) could provide a route for increased use of sustainable PHA plastics.

What is PHA??

- Polyhydroxyalkanoates or PHAs are polyesters produced in nature by numerous microorganisms, including through bacterial fermentation of sugars or lipids.
- When produced by bacteria they serve as both a source of energy and as a carbon store.
- More than 150 different monomers can be combined within this family to give materials with extremely different properties. These plastics are biodegradable and are used in the production of bioplastics. [3]

- They can be thermoplastic, with melting points ranging from 40 to 180 °C.

THE HINDU