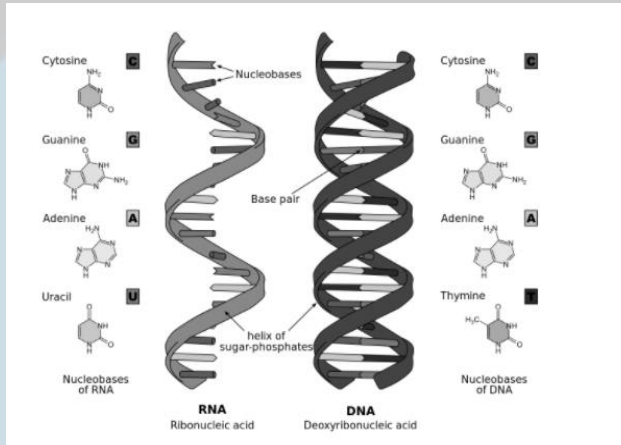## Heterosis

HETEROSIS

Heterosis- *refers to superiority of F₁ hybrids in one or more characters over its parents.*

The term hybrid vigour is used as synonym for heterosis.

➢ Heterosis differs from luxuriance.

➢ Heterosis- as increase of F₁ over parents in general vigour, yield and adaptation.

➢ **Luxuriance** -as increase of F₁ over parents in vegetative growth but not in yield and adaptation.

Parts of a Flower
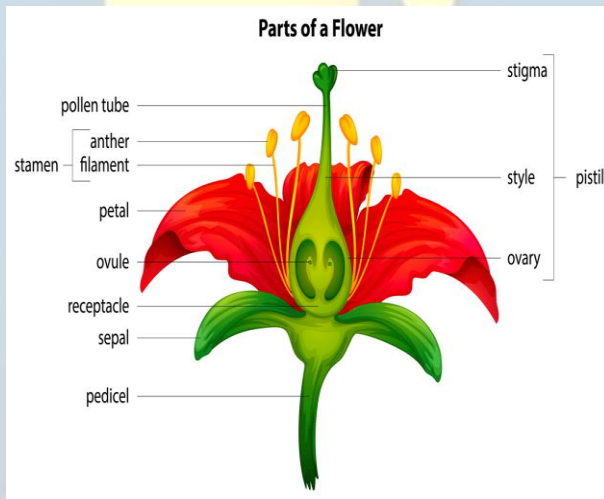
Male Sterility

- Male sterility is characterized by nonfunctional pollen grains, while female gametes function normally.
- Inability to produce or to release viable or functional pollen as a result of failure of formation or development of functional stamens, microspores or gametes.
- Main reason is mutation.

- The males of plants as diverse as cabbage, cauliflower, broccoli, tomato, and rice can be made sterile by deleting a very small part of their genome's DNA.

- This is the take-home message of a paper published in the journal Nature Communications in October by researchers at the State Key Laboratory of Vegetable Biobreeding of the Chinese Academy of Agricultural Sciences, Beijing.

- Instead of loss, the researchers assure us of a gain: that the deletion could lead to an abundant harvest of these plants, thanks to a process called heterosis.

Genes and promoters

- The DNA molecule consists of two long strands. Each strand is composed of four compounds called nucleotide bases.

- They are designated A, C, G, and T for simplicity (for adenine, cytosine, guanine, and thymine respectively).

- An A on one strand makes chemical bonds, called hydrogen bonds, with a T on the other and a C on one strand makes hydrogen bonds with a G on the other.

- The bonds between As and Ts and the bonds between Gs and Cs hold the two DNA strands together.

- A base pair, or bp for short, is a single AT or GC pair between the two strands, with the dash denoting the bond.

- The genome of the cabbage plant (Brassica oleracea) consists of around 1.06 billion base pairs organised in 18 chromosomes, which every cell holds in nine pairs of two each.

- In each pair of two chromosomes, one chromosome comes from the pollen and the other comes from the egg.

- DNA and RNA are the master and working copies of a gene.

- The RNA is loaded into a cellular machinery called the ribosome.

- The ribosome uses the base sequence of RNA to specify the sequence in which amino acids are linked together to create the protein encoded by the gene.

- Pollen loss promotes heterosis

- Around 44 years ago, people found a cabbage plant that contained a natural mutation.

- As a result of this mutation, they found that the plant had lost the ability to make pollen.

- At first, scientists didn't know which particular gene in the plant had been mutated.

- They only named the altered gene, whichever it was, Mscd1.

- The mutation's effect was to make the plant male sterile, but they had no other defects.

- All the seeds from the mutant plants were the result of the plants' eggs being fertilized by pollen from plants of other strains a process called outcrossing.

- None of their seeds came from self-crossing.

- (In a self-cross, an egg is fertilized by the pollen of the same strain.)

- Outcross seeds which are also called hybrid seeds germinate to produce more robust plants than self-cross seeds.

- This is because of a phenomenon called **hybrid viguor** or, in technical terms, **heterosis**.

- Using an approach called **genetic mapping**, the researchers found that the only difference between a mutated Ms cd1 gene and a non-mutated Ms cd1 gene was that the promoter in the former was missing one DNA base pair.

- **The Hindu**

RISCV. (Reduced Instruction Set Computer)

- The People's Liberation Army's (PLA) Academy of Military Sciences had used an open source standard known as RISCV to reduce malfunctions in chips for cloud computing and smart cars, the patent filing shows.

- RISCV is an instruction set architecture, a computer language used to design anything from smartphone chips to advanced processors for artificial intelligence.

- The RISC-V (Reduced Instruction Set Computer) processor is a chip that is still in it's infancy, but it's a chip that everyone should be supporting.

- The RISC-V architecture is great because it is the only processor that has a completely open source instruction set

- What's an open source instruction set?

- In layman's terms, it means that the way the processor moves around 1s and 0s is available for everyone to see.

- Another benefit of RISC-V is that it enables companies to develop a product that is tailored specifically to their workload, so they start with the RISC-V core and can add whatever it is they specifically need, saving both time and money.

- These savings can theoretically be passed on to the consumer either through a lower cost, or in the longterm by having a lower energy footprint.

- U.S. and UK export controls prevent the sale of only the most advanced x86 and Arm designs which produce the highest performance chips to clients in China.

- But as the U.S. widens restrictions on China's access to advanced semiconductors and chip-making

equipment, the open source nature of RISCV has made it part of Beijing's plan to curb its dependence on Western technology, although the emerging architecture accounts for a fraction of the chip market.

- Recent RISCV breakthroughs and applications in China, many with government funding, have raised Beijing's hopes that the open source standard could one day threaten the x86 Arm duopoly.

- RISCV chips made by Chinese firms and research institutes can now power self-driving cars, artificial intelligence models, and data storage centers, according to two industry figures and the previously unreported documents.

  The Hindu

- **MYANMAR CIVIL WAR AND INDIA'S INTEREST**

Kaladan Multi Modal Transit Transport Project

Siliguri Corridor
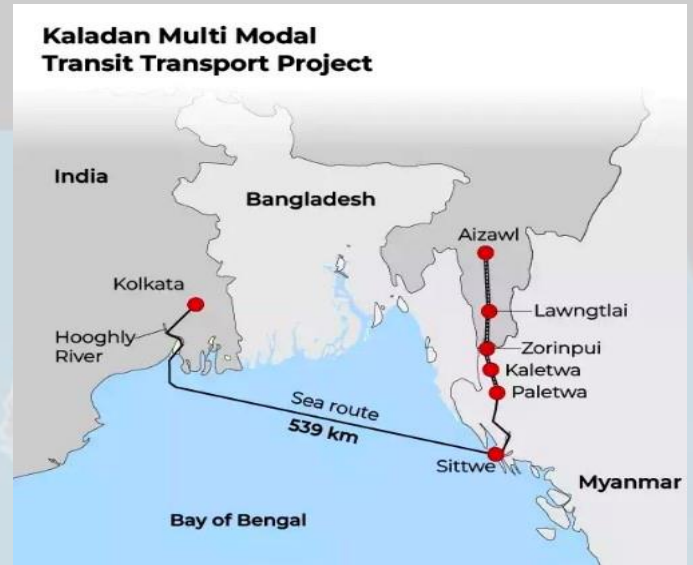
- The fall of the town of Paletwa has altered the dynamic between the Chin and the Arakan ethnic groups.

- A majority of Paletwa residents belong to the Chin ethnic community, and they see their town as an integral part of their homeland.

- On the other hand, some in the Rakhine State, previously known as Arakan, contend that the township was historically part of the Arakan Hill Tracts during colonial rule and should have been part of their province.

- to maintain peace and order, it is imperative that the Chin and Arakan groups agree on an inclusive framework for the governance of Paletwa and adjoining areas.

India's stake

- The developments in Paletwa will also impact the Indian government's Kaladan Multimodal Transit Transport Project (KMTTP) in Myanmar, which has already faced significant delays.

- The Kaladan project was aimed at addressing the geo-economics and geo-political challenges of northeast India.

- The partition of the subcontinent and the subsequent hardening of borders converted northeast India into a landlocked region.

- Transporting goods to and from northeast India via the narrow Siliguri corridor is an expensive affair, and in a worst case scenario with China, there is a possibility of movement along the corridor being adversely affected.

- Therefore, the Kaladan project was conceptualized as an alternative route that gives northeast India access to the sea.

- India and Myanmar signed the framework agreement on the Kaladan project in 2008.

- The operationalization of the project was delayed because of rugged terrain, inadequate inter-departmental coordination, political instability and security challenges in Myanmar.

- While the Sittwe port and inland water terminal at Paletwa have been completed in the past few years, road construction is facing challenges due to the prevailing security situation in Myanmar.

China's investments in the region

- The Arakan Army, along with the Myanmar National Democratic Alliance Army and the Ta'ang National Liberation Army, is part of the Three Brotherhood alliance, which some claim has China's support.

- The alliance has pledged to protect Chinese investments in Myanmar.

- There are reports which suggest that the Arakan Army receives considerable funding and military equipment from China.

- The successful completion of the Kaladan not only competent technical personnel but also experts who can diligently monitor the fluid Chin Arakan ethnic relations, the changing contours of military EAO contestation, sectarian violence in the Rakhine state, and the growing Chinese footprint in Myanmar, specifically in the Rakhine state.

- The Hindu

GRAMMY AWARD

- Taylor Swift Won Album of the Year at the Grammy Awards for Midnights, breaking the record for most wins in the category with four.

India in Grammy

- Indian music struck a chord at the 2024 Grammy Awards with five musicians from the country, including tabla maestro Ustad Zakir Hussain and flautist Rakesh Chaurasia, winning the coveted prize in Los Angeles.

- While Mr. Hussain was India's big winner with three Grammys, Mr. Chaurasia picked up two awards.

- Singer Shankar Mahadevan, violinist Ganesh Rajagopalan, and percussionist Selvaganesh Vinayakram, Mr. Hussain's collaborators in the fusion group Shakti, won one Grammy

- Shakti won the 2024 Grammy Award for best global music album for This Moment.

- Besides his award for Shakti, Mr. Hussain won two other awards Best Global Music Performance for Pashto and best contemporary instrumental album for as We Speak.

- The Hindu