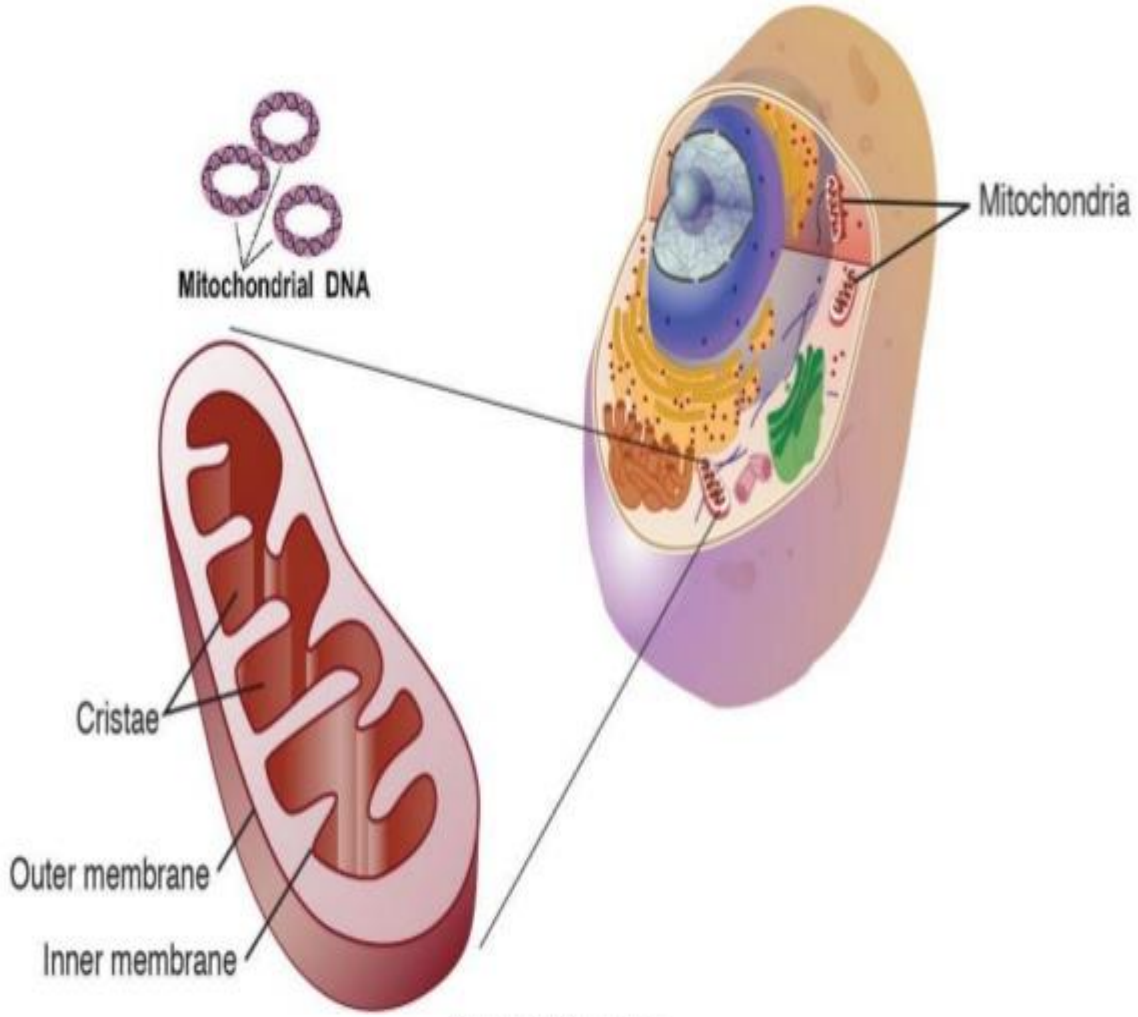

The cell cytoplasm consists of **autonomous organelles** like mitochondria and plastids which are having their own genes.

Cytoplasmic inheritance can define as the process of inheritance of characters by the means of genes present in cytoplasmic elements like mitochondria, plastids etc .

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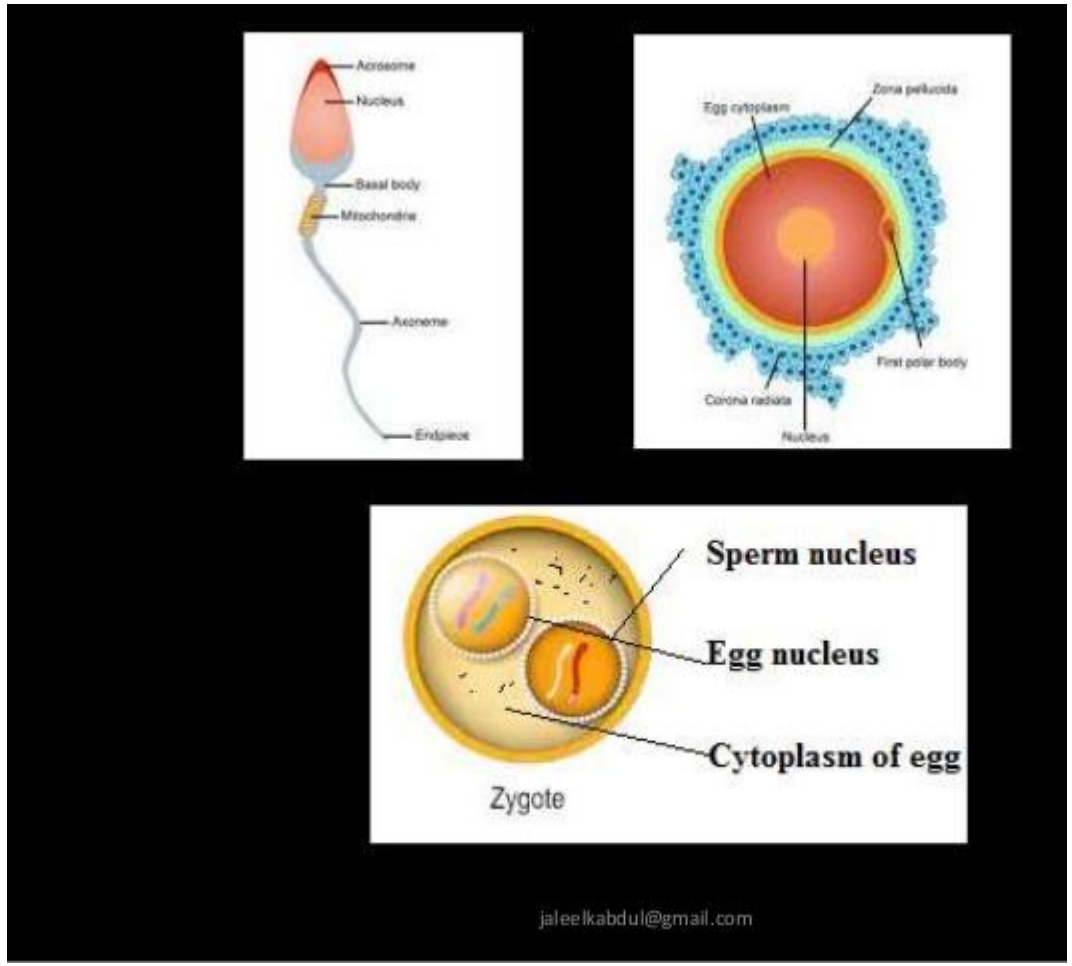
TOPIC: CYTOPLASMIC INHERITANCE

BY

HIMSHIKHA YADAV



Correns in Mirabilis jalapa and by Baur in Pelargonium zonale in 1908

Sonneborn (1943) described the inheritance of some cytoplasmic particles known as kappa and their relation to nuclear gene in Paramecium.

Boycott and Driver(1923) showed that the character of coiling is determined by the gene of the mother

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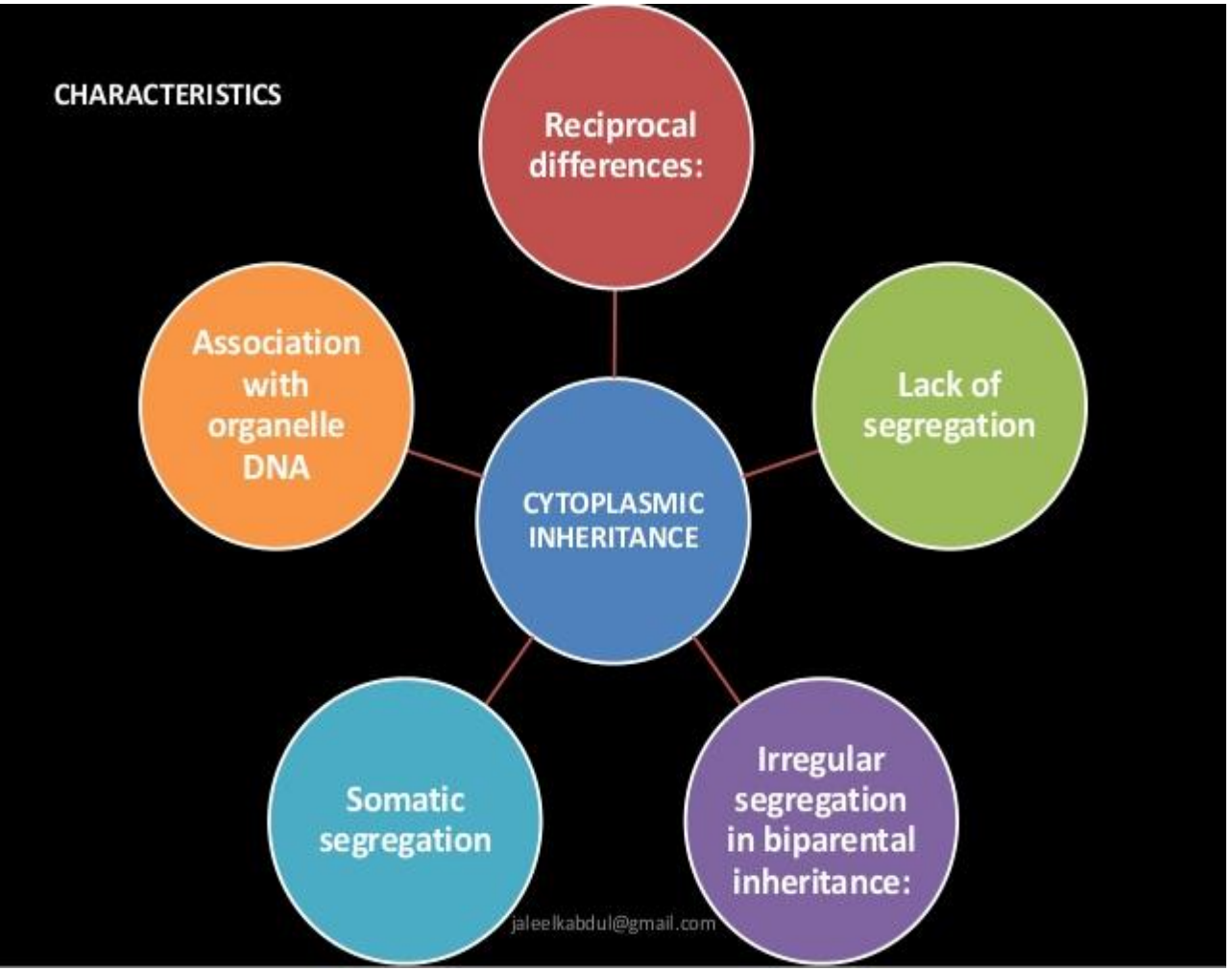
CHARACTERISTICS
Reciprocal differences:
Association with organelle DNA
CYTOPLASMIC INHERITANCE
Lack of segregation
Somatic segregation
Irregular segregation in biparental inheritance:
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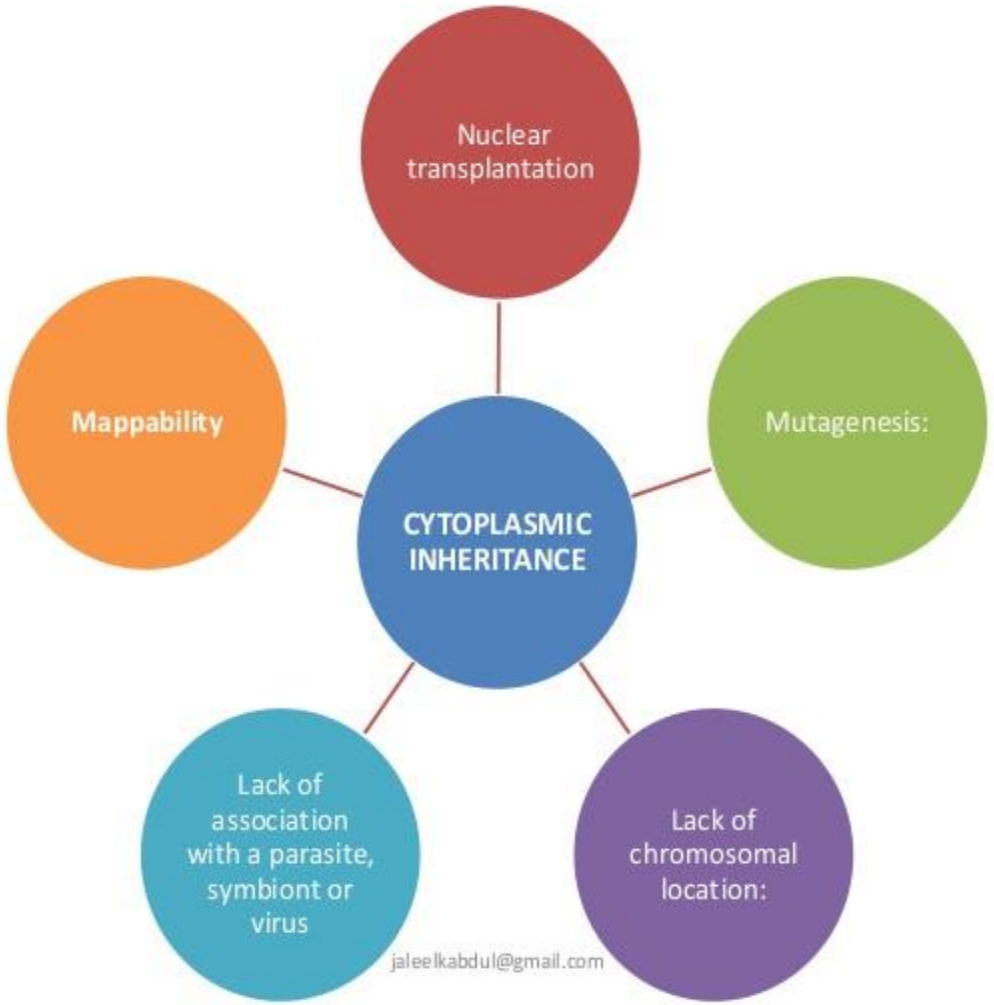
Nuclear transplantation
Mappability
CYTOPLASMIC INHERITANCE
Mutagenesis:
Lack of association with a parasite, symbiont or virus
Lack of chromosomal location:
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Maternal (organelle) Inheritance

1. DNA contained in mitochondria or chloroplasts determines the phenotype of the offspring.

2’. These phenotypes arise due to the source of organelles—only from the egg—such that there is only a maternal influence on phenotype.

3. This is to say that the cytoplasmic organelles such mitochondria & chloroplast are inherited with the egg cytoplasm from the maternal parent.

4. **Examples**
   - Shell coiling in snail.
   - Eye pigmentation in water fleas and flour moths

Boycott and Driver(1923) showed that the character of coiling is determined by the gene of the mother and not by the individual's own gene.

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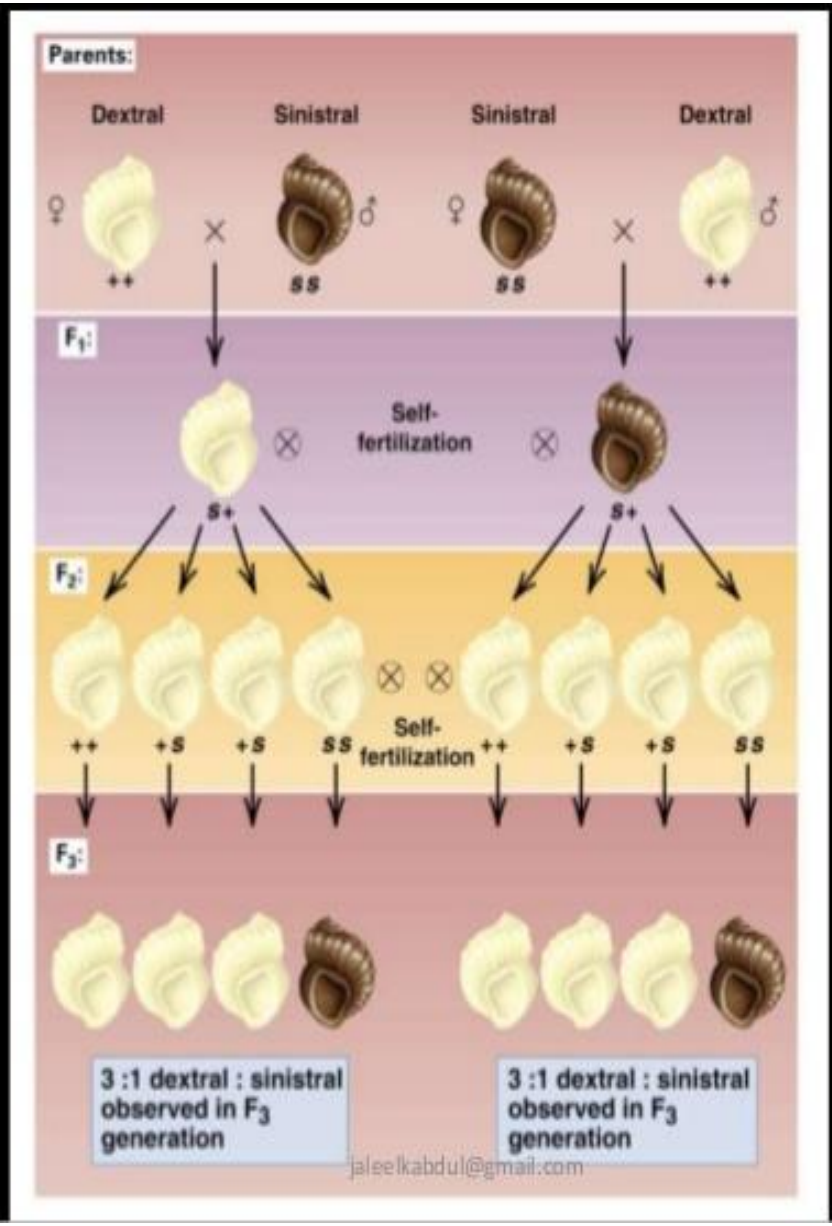
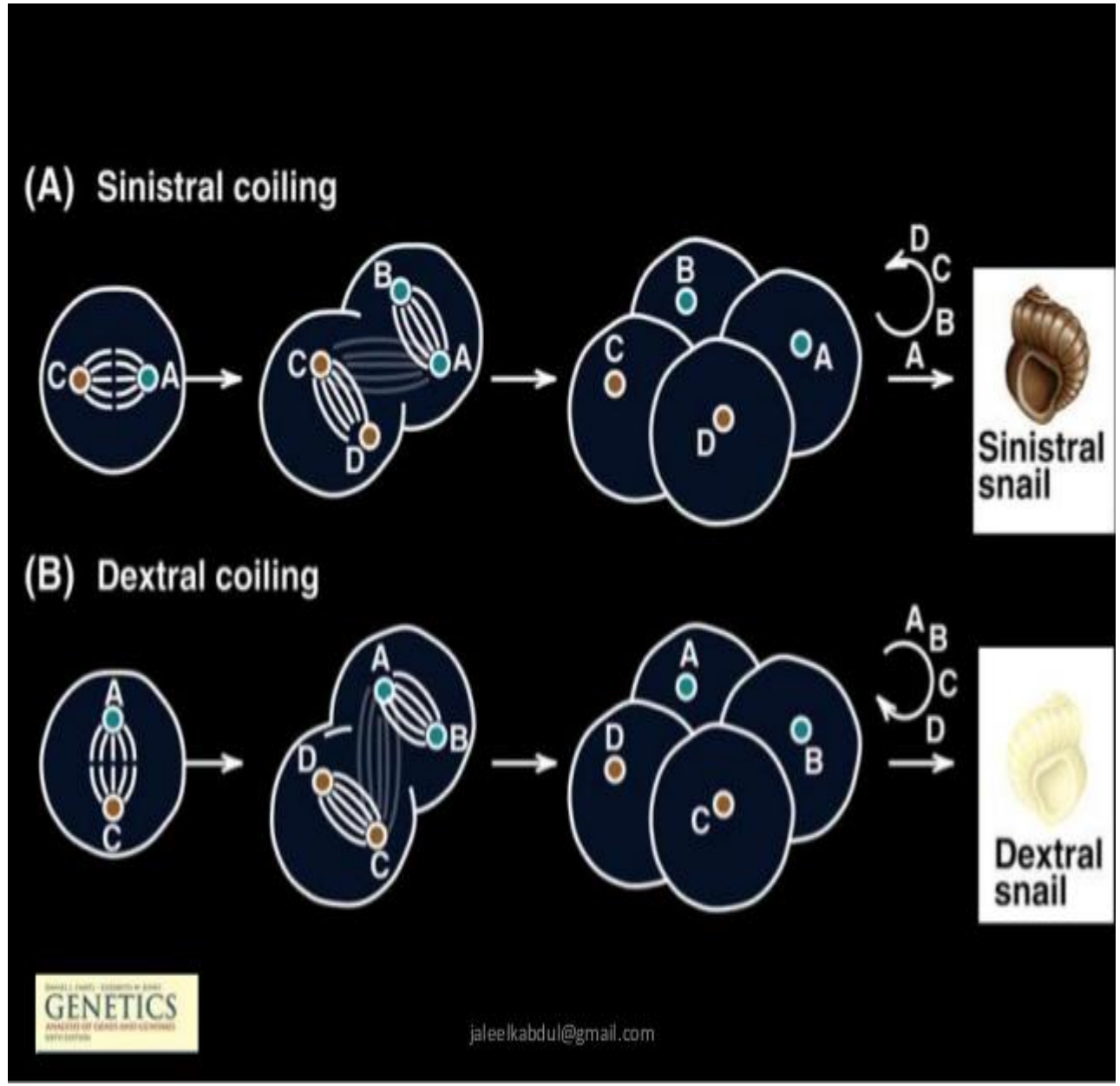


GENETICS


(A) Sinistral coiling
C
A
B
C
A
D
B
C
D
A
D
C
B
A
Sinistral snail
(B) Dextral coiling
A
C
A
B
D
C
A
D
B
C
A
B
C
D
Dextral snail
GENETICS
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Extra-Nuclear Inheritance by Endosymbionts

1. • Certain intra-cellular parasites such as bacteria and virus particles maintain symbiotic relationship with host cells.
2. • They are self-reproducing and look like the cytoplasmic inclusions.
3. • Sometimes they exhibit an infection like transmission with a hereditary continuity of their own.
4. • **The symbiotic or parasitic association of microorganism with a host organism thus results in transmission of a phenotype in offspring of the host offspring**
   • Examples Sigma virus in *Drosophila*, Kappa Particle in *Paramecium*

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described the inheritance of some cytoplasmic particles known as kappa and their relation to nuclear gene in Paramecium

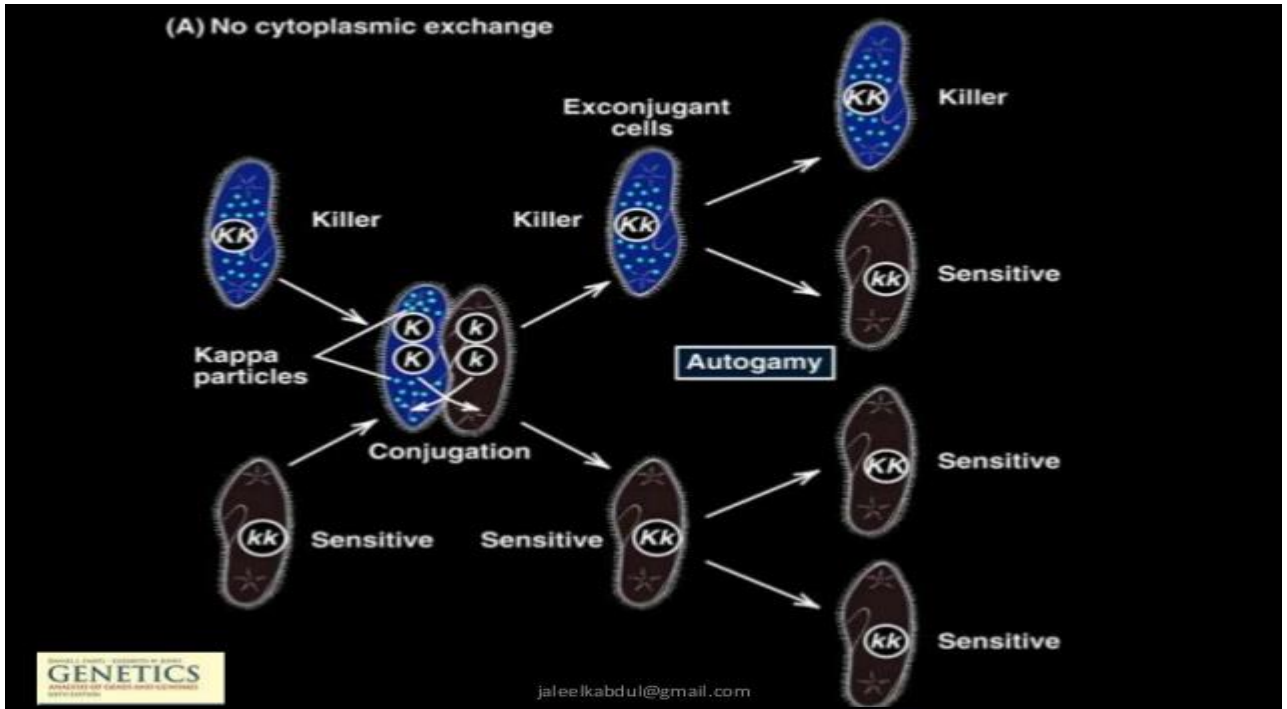
There are two strains of Paramecium one killer and the other sensitive.

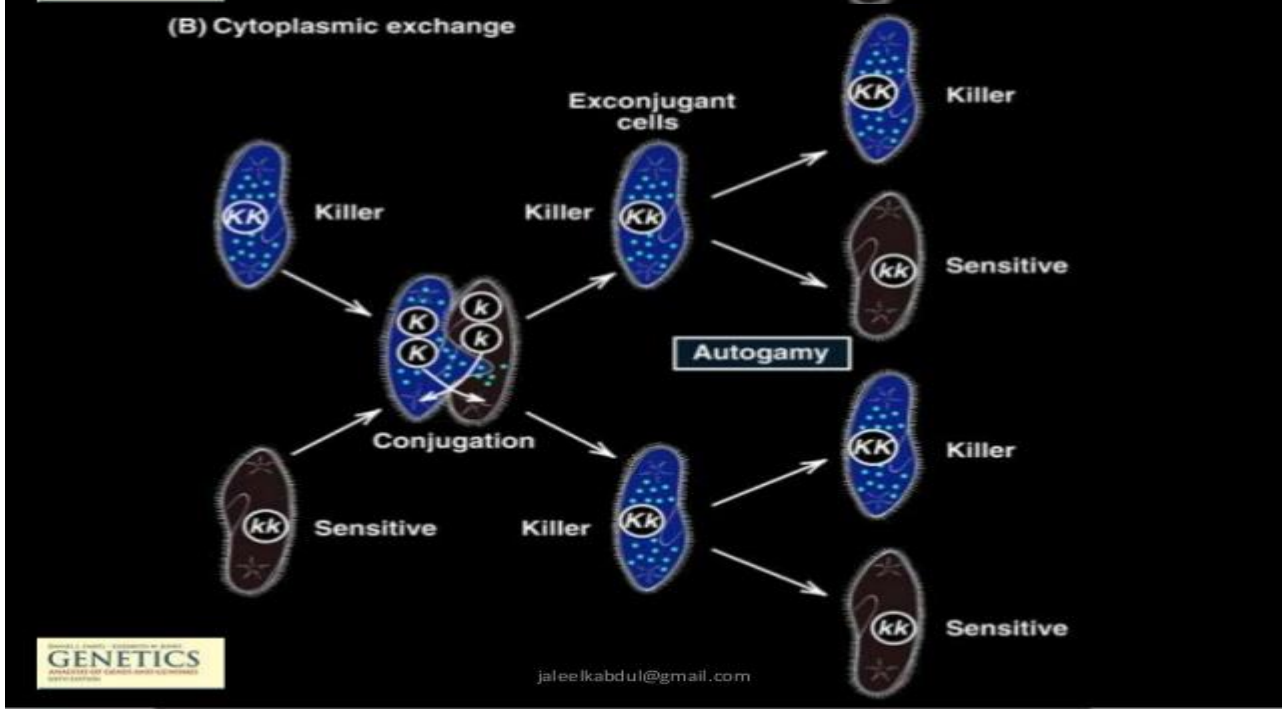
Kappa particle

The killer secretes a toxic substance called paramecin which kills the sensitive.

The paramecia of killer strain contain large number of kappa particles in their cytoplasm.

The production of kappa particles is dependent on a dominant allele K, so that killer strains are KK or Kk and sensitive strains are ordinarily kk.





Significance of Cytoplasmic Inheritance

1. Development of cytoplasmic male sterility several crop plants like maize. Pearl millet,cotton etc

2. Role of mitochondria in the manifestation of heterosis.

3. Mutation of chloroplast DNA and mitochondrial DNA leads to generation of new variation

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Thank you

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