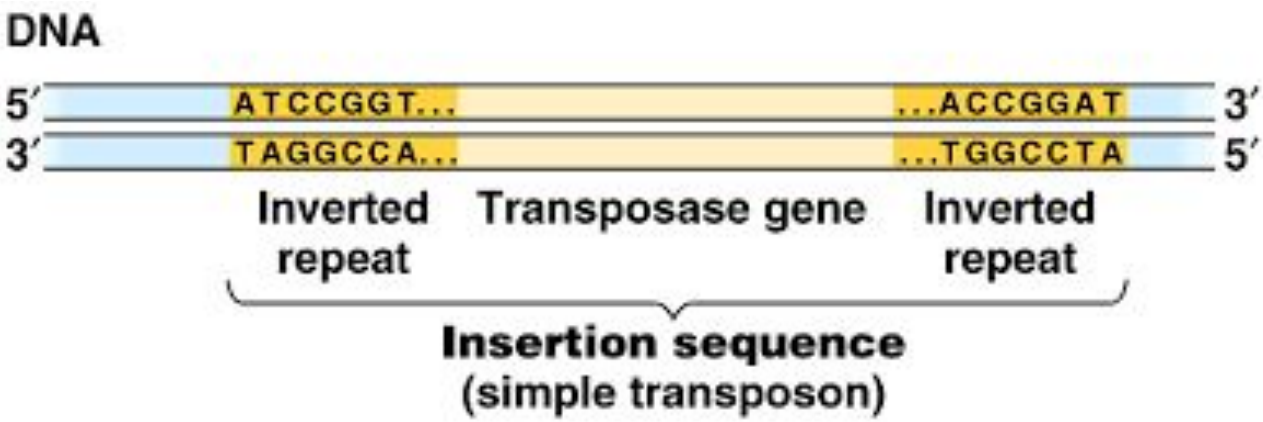
Transposable Elements in Prokaryotes



Transposable Elements

- Transposable elements are also known as "***TRANSPOSONS***", "***JUMPING GENES***", "***MOBILE GENETIC ELEMENTS***".
- These are DNA sequences able to transport themselves to other location within the genome.
- 1st transposable element was discovered by ***Barbara McClintock*** in ***maize*** in ***1950.***
- Term was given by "***Hedges and Jacob(1947).***

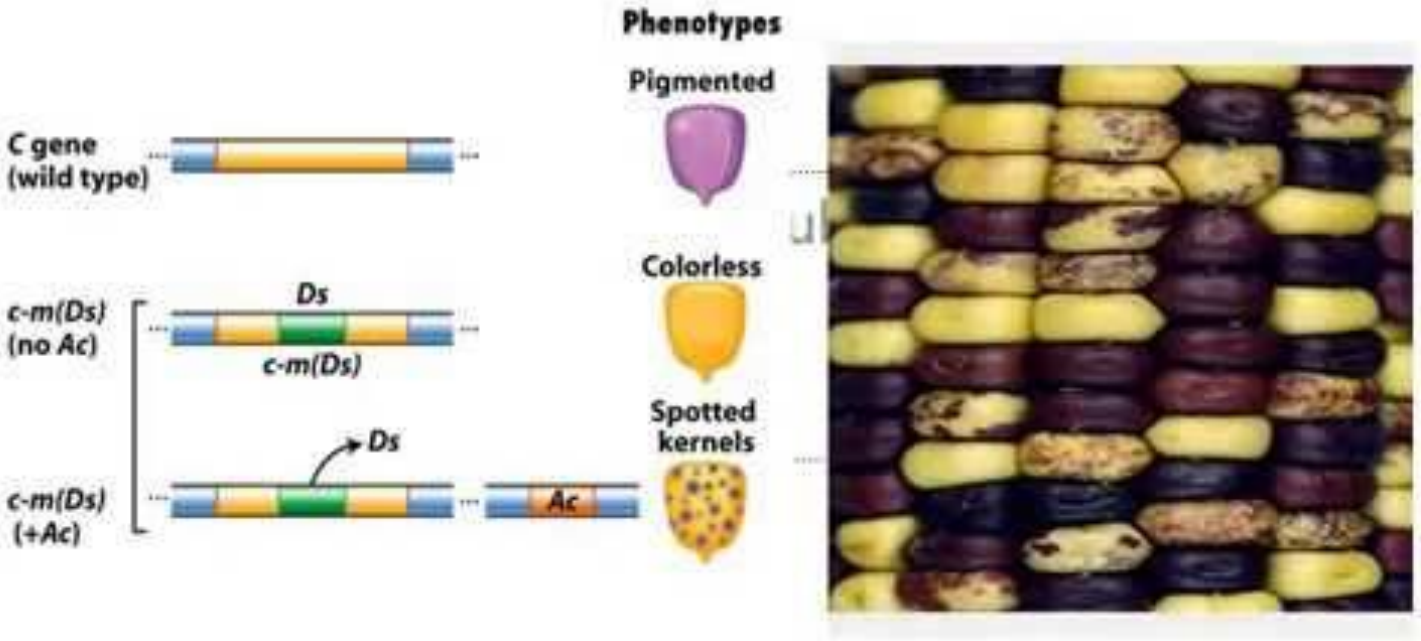
TRANSPOSABLE ELEMENTS

- A sequence of DNA that can change its position within a genome. Also known as Transposable Elements(TE).
- Transposition often results in the duplication of the transposable elements.
- Popularly called jumping genes.
- Discovered by Barbara McClintock in 1940.
- Won the Nobel Prize in 1983 for the same.

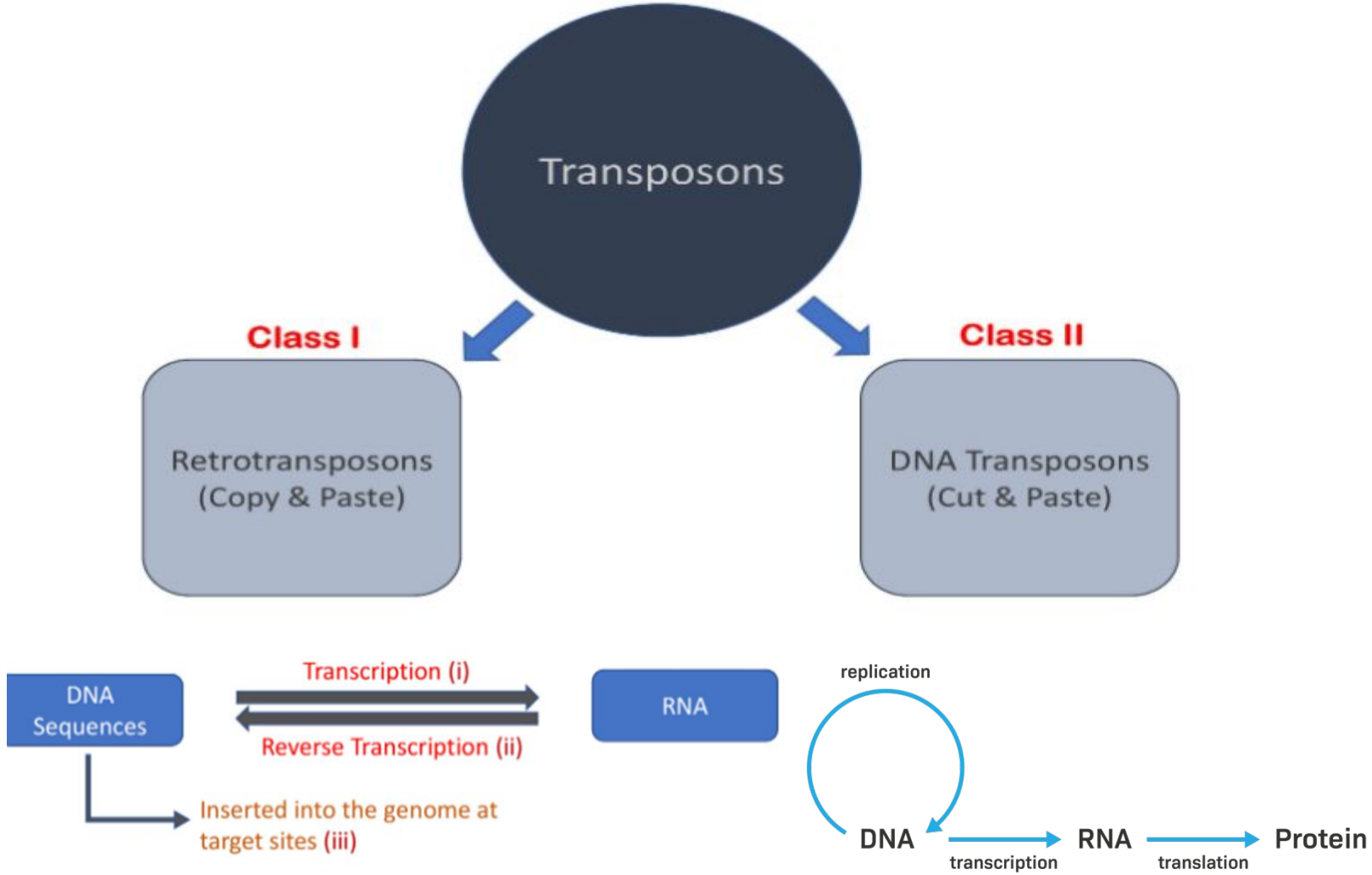
DISCOVERY OF MOBILE GENETIC ELEMENT

- The 1st transposable element was discovered by "***Barbara McClintock (1902-1990)***" in **Maize in late 1940s.**
- Her discovery of jumping genes, through an analysis of **genetic instability in Maize, earn her noble prize in 1983** in Physiology or Medicine**.**
- The instability involves chromosome breakage and was found to occur at sites where transposable elements were located i.e. at **C locus of 9th chromosome.**

Transposons (Ac/Ds elements *in* Maize)



CLASSIFICATION



These mobile segments of DNA are sometimes called **"jumping genes"**

There are two distinct types of transposons:

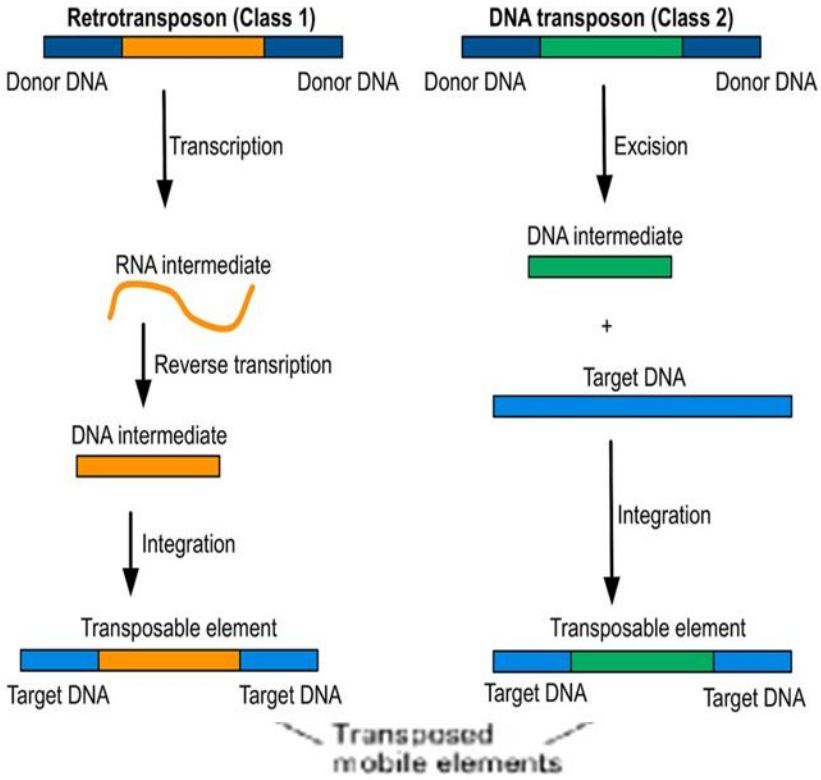
1) **DNA transposons**

-transposons consisting only of DNA that moves directly from place to place

2) Retrotransposons

- first transcribe the DNA into RNA and then
- use reverse transcriptase to make a DNA copy of the RNA to insert in a new location

Classification of Transposons into two classes



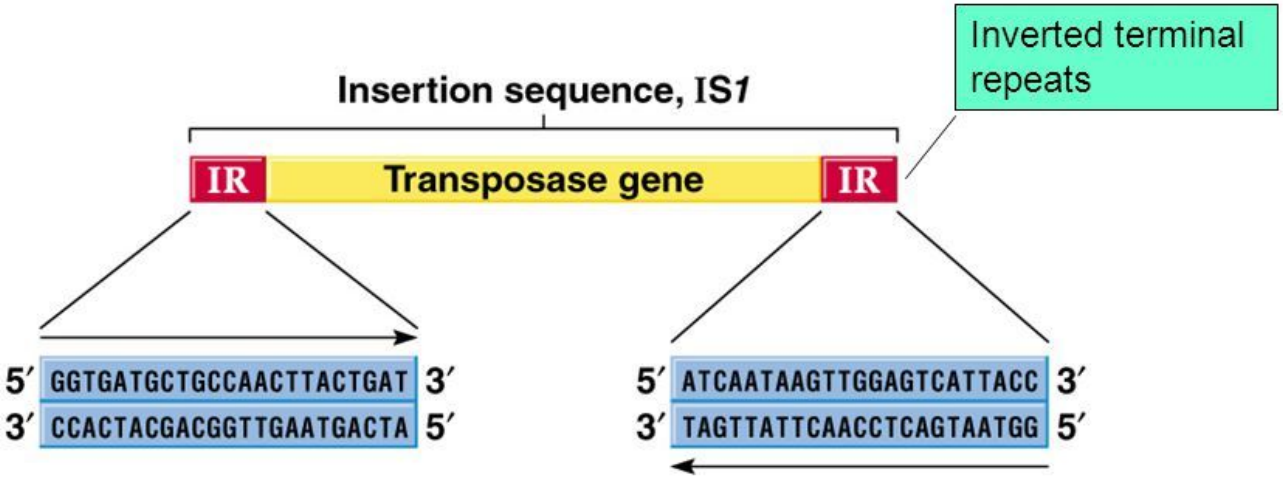
In both cases ds DNA intermediate is integrated into the target site in DNA to complete movement

Transposable Genetic Elements In Prokaryotes

- **The four transposable genetic elements in prokaryotes are:**
- **(1) Bacterial Insertion Sequences**
- **(2) Prokaryotic Transposons**
- **(3) Insertion-Sequence Elements and Transposons in Plasmids and**
- **(4) Insertion-Sequence Elements and Transposons in Phage mu.**

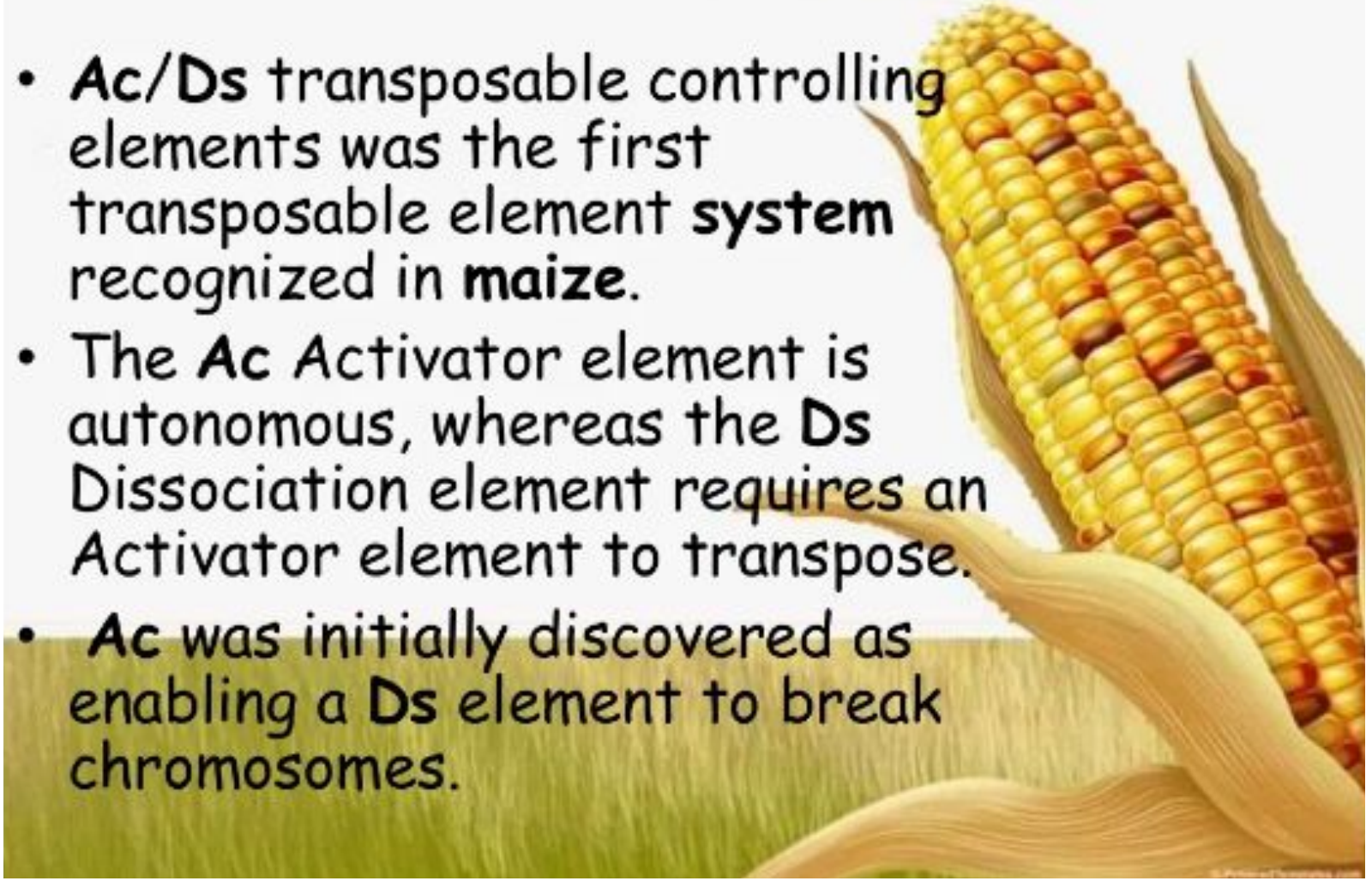
Insertion sequence (IS) elements:

- Simplest type of transposable element
  - Found in bacterial chromosomes and plasmids.
  - Encode only genes for mobilization and insertion.



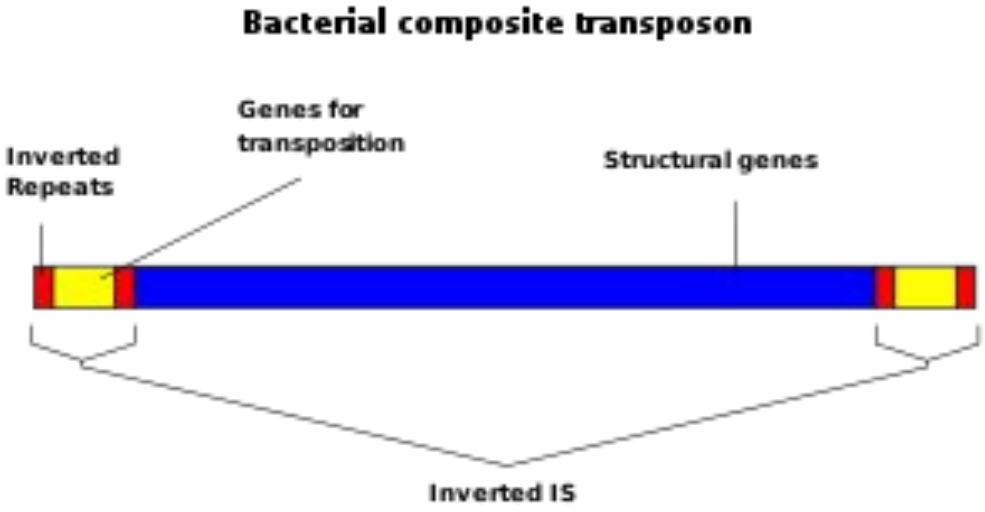
AC –DS SYSTEM

- **Ac/Ds** transposable controlling elements was the first transposable element **system** recognized in **maize**.
- The **Ac** Activator element is autonomous, whereas the **Ds** Dissociation element requires an Activator element to transpose.
- **Ac** was initially discovered as enabling a **Ds** element to break chromosomes.



Importance's of Transposable Elements

- Transposable elements (TEs) are DNA sequences with the ability to move within genomes.
- Transposon movement can result in mutations, alter gene expression, induce chromosome rearrangements and, due to increase in copy numbers, enlarge genome sizes. Thus, they are considered an important contributor for gene and genome evolution.




Thank
you!