VIROIDS

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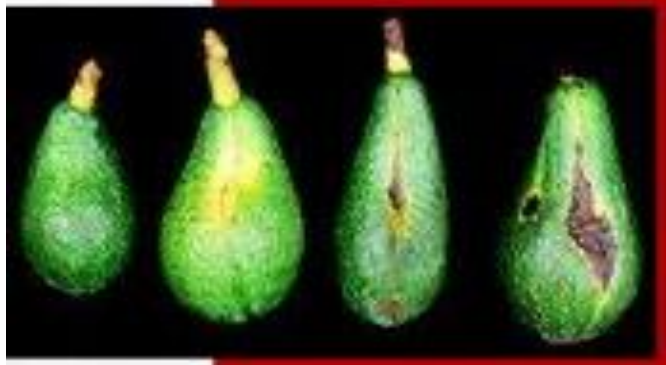
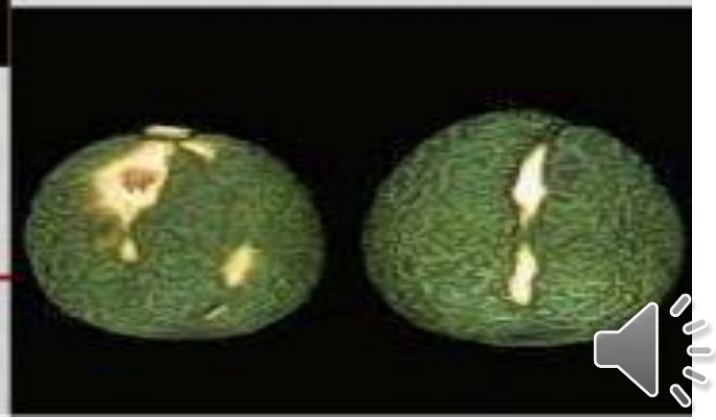
GDC RAVULAPALEM



VIROIDS



INTRODUCTION

Viroids are small RNA circles, only 300 to 400 nucleotides long, lacking AUG codon

The term viroid was coined by Diener (1971) who discovered the first viroid, called Potato spindle tuber viroid or PSTV

- **Viroids** are sub-viral infectious entities that infect plants.
- They are **acellular infectious** agents like the prions that lack the essential features of a virus; and which are capable of directing their own replication since they have small naked RNA as their genome.
- Unlike the prions which lack nucleic acids (inclusive of DNA and RNA), viroids contain single-stranded RNA molecules.

- Viroids are generally plant-pathogenic infectious particles that comprises of small, naked and circular ssRNA.

- They lack protein coat since they are naked ssRNA molecules.

- The ssRNA depends entirely on the infected host cell for its replication since they lack genes that encode protein biosynthesis; and they rarely code for any protein molecule.

- Viroids can exist outside of their plant host cell unlike viruses.

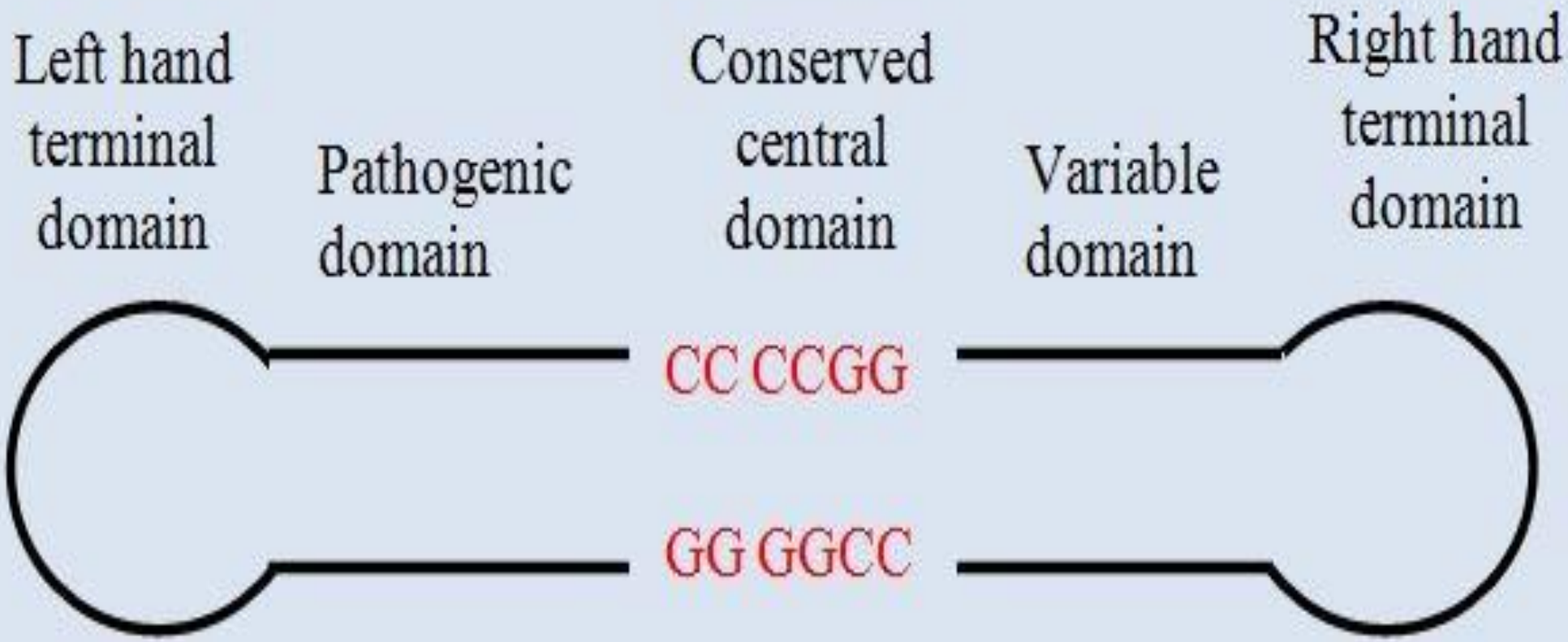
Viroid structures

- Two main groups of viroids: self-cleaving and non-self-cleaving

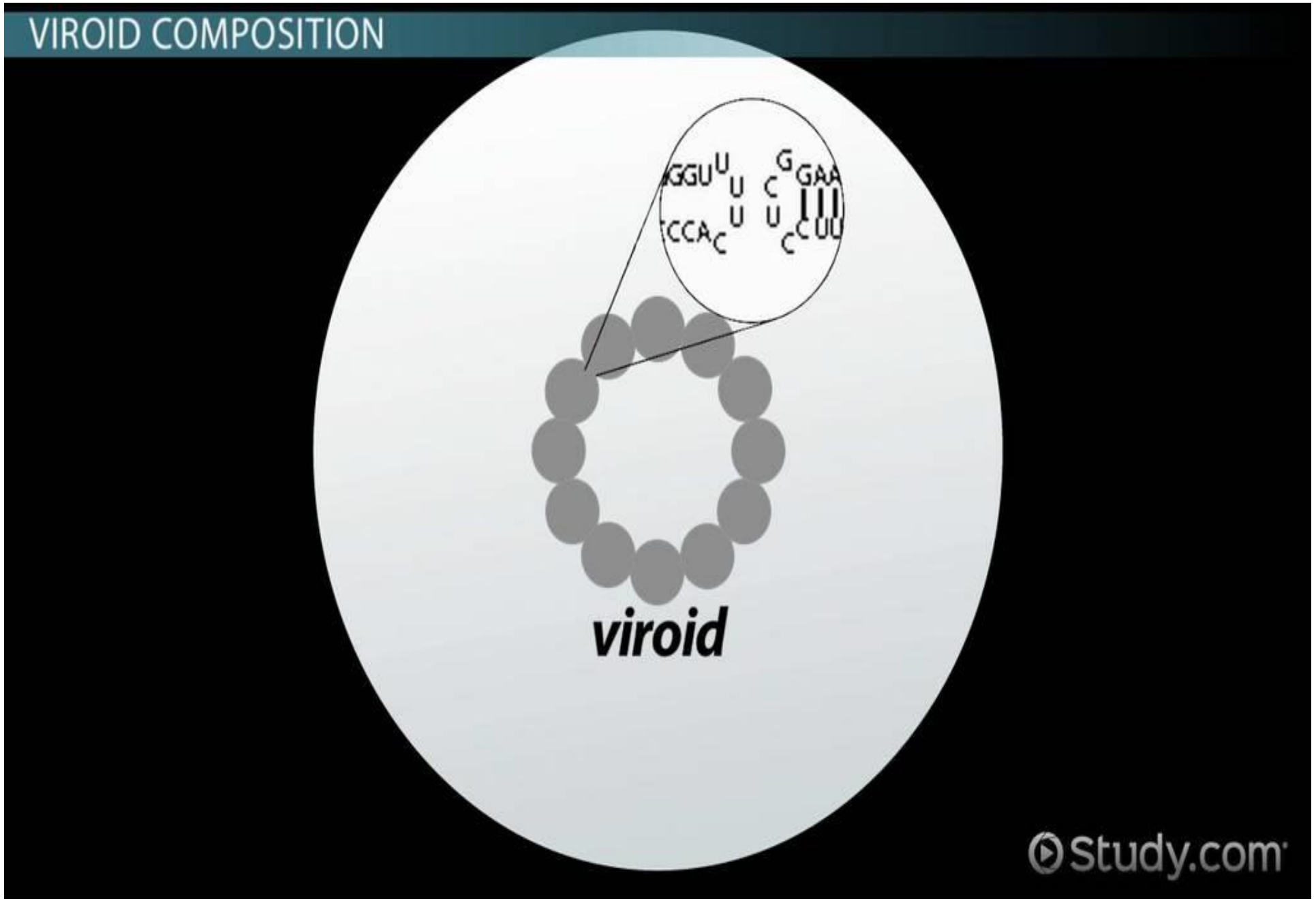
- Non-self cleaving viroids replicate in nucleus and fold into "dog bone" or rod-like structure

- All are covalently closed circular RNAs fold to tightly base-paired structures

- Five domains identifiable in non-self-cleaving
  - **Terminal left (TL)**
  - **Terminal right (TR)**
  - **Pathogenicity (P)**
  - **Central (C)**
  - **Variable (V)**


Left hand terminal domain
Pathogenic domain
Conserved central domain
Variable domain
Right hand terminal domain
CC CCGG
GG GGCC

VIROID COMPOSITION



DISEASES CAUSED BY VIROIDS

- Viroids cause significant damage to crop plants. And this lead to considerable commercial damage to agricultural products, a factor that can impact negatively on food security.
- Viroids are transmissible from plants to plants, and they are the smallest known pathogens that contain a nucleic acid molecule (particularly ssRNA).
- Some of the plant diseases caused by viroids include: tomato apical stunt viroid (TASV), coconut cadang-cadang viroid (CCCV), potato spindle tuber viroid (PSTV), tomato bunchy top viroid (TBTV), cucumber pale fruit viroid (CPFV), citrus exocortis viroid (CEV) and hop stunt viroid (HSV) amongst others.
- Cocaviroid, Popsiviroid, Coleviroid, Hostuviroid and Pelamoviroid are some examples of viroid families or genera that cause disease in plants.

DISEASES CAUSED BY VIRIODS

- Viriods causes over 20 different plant diseases of which the most studied are
  - POTATO SPINDLE-TUBER DISEASE
  - CHRYSANTHEMUM STUNT DISEASE

fppt.com


Potato spindle tuber viroid (PSTVD0) - https://gd.eppo.int

CHRYSANTHEMUM STUNT DISEASE

- The symptoms of plant infection by viroid's is usually seen as plant discoloration, leave malfunction, fruit malfunction and stunted growth of particular crop plants.
- The transmission of viroid's amongst crop plants usually occur during crop propagation such as in grafting of plants and via other mechanical damage to the plant; and viroids can also be transmitted via pollen grains and seeds amongst plants.
- The mechanical damage that causes viroids to penetrate food crops or plants can be caused by farming implements such as cutlasses, hoes and diggers.
- Some insects especially aphids are notorious in transmitting plant viruses (i.e. viroids) via insect bites; and this occurs when the insects feed on plant saps.

THANK YOU