BHARATHIDASAN UNIVERSITY

Tiruchirappalli- 620 024
Tamil Nadu, India

Programme: M.Sc. Biochemistry

Course Title : Chromatin and Epigenetics
Course Code : BC205DCE

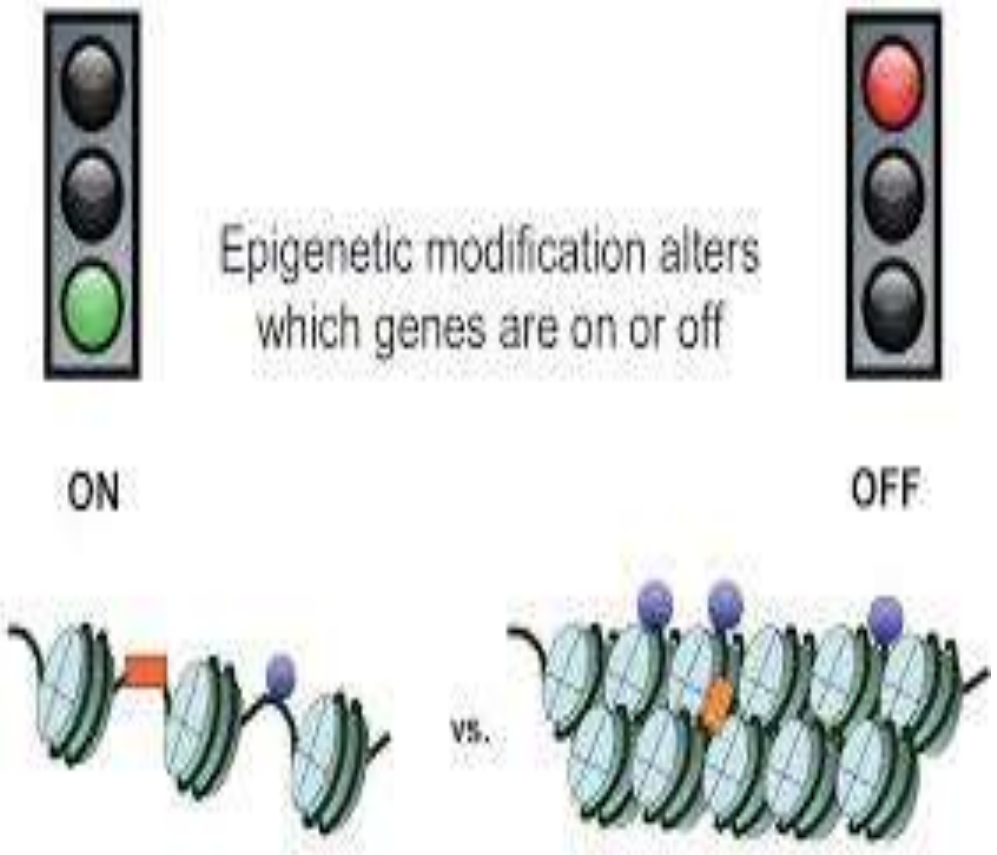
Unit-3
Epigenetic Modifications

Dr. V. RAVIKUMAR
Professor
Department of Biochemistry

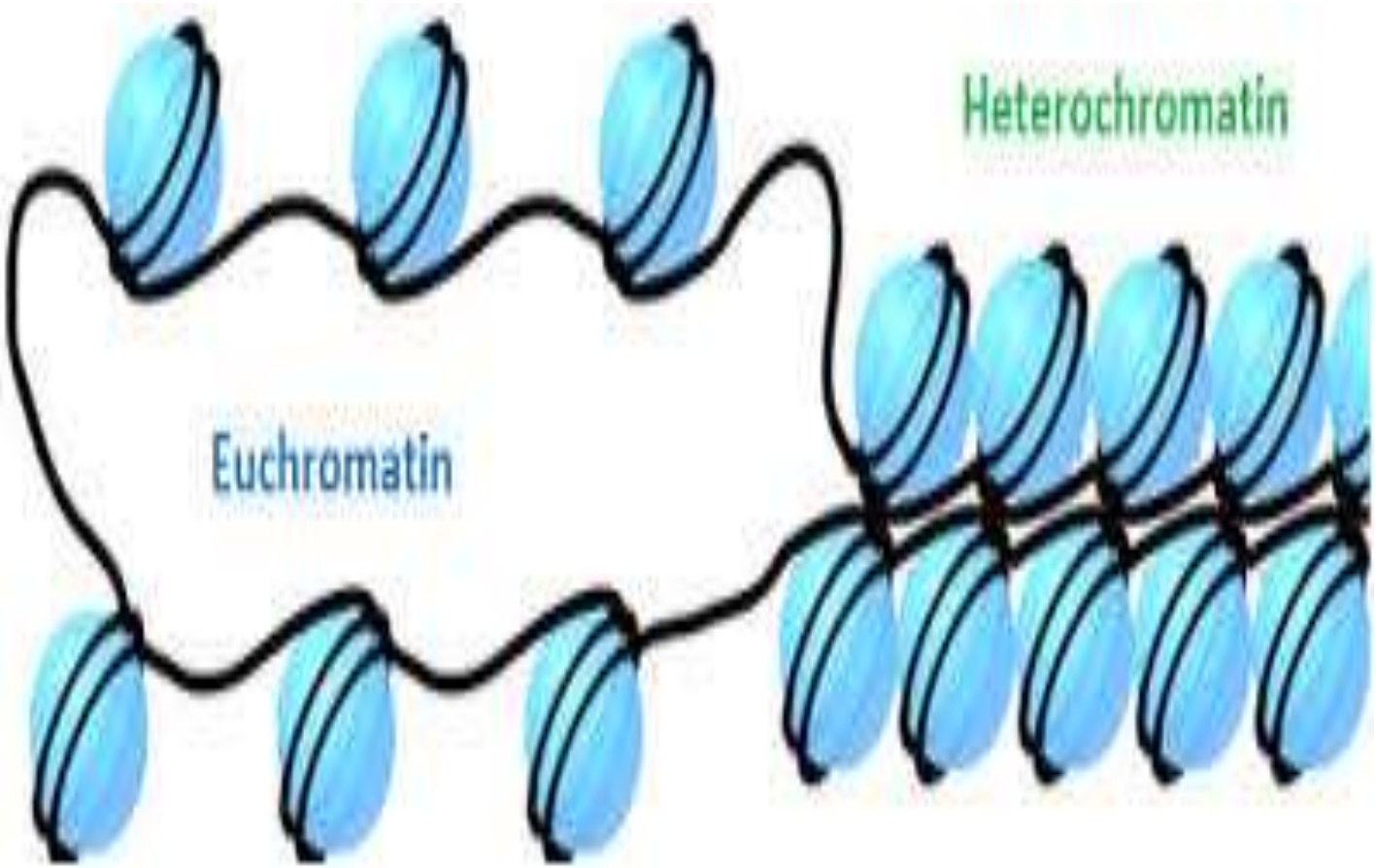
Unit-3 Overview

- Chromatin remodeling by DNA binding proteins
- SWI/SNF family repositioning nucleosomes
- Chromatin modifications by spontaneous conformational change
- Covalent modifications
- Epigenetic modifications
- DNA methylation
- Post translational modification of histones

Epigenetic Modifications



EUCHROMATIN AND HETEROCHROMATIN



Mechanism of Epigenetics

- **Covalent Modifications**

  DNA and Histone proteins

- **Non-covalent modifications**

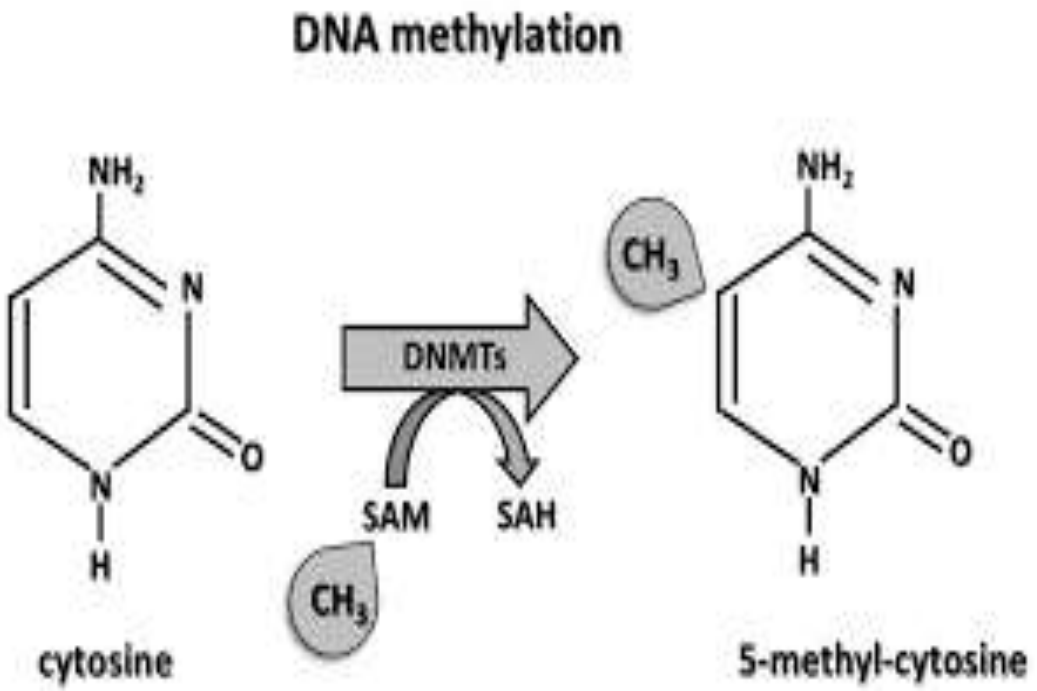
  Histone variants, Nucleosomes remodelling and non coding RNA

DNA methylation

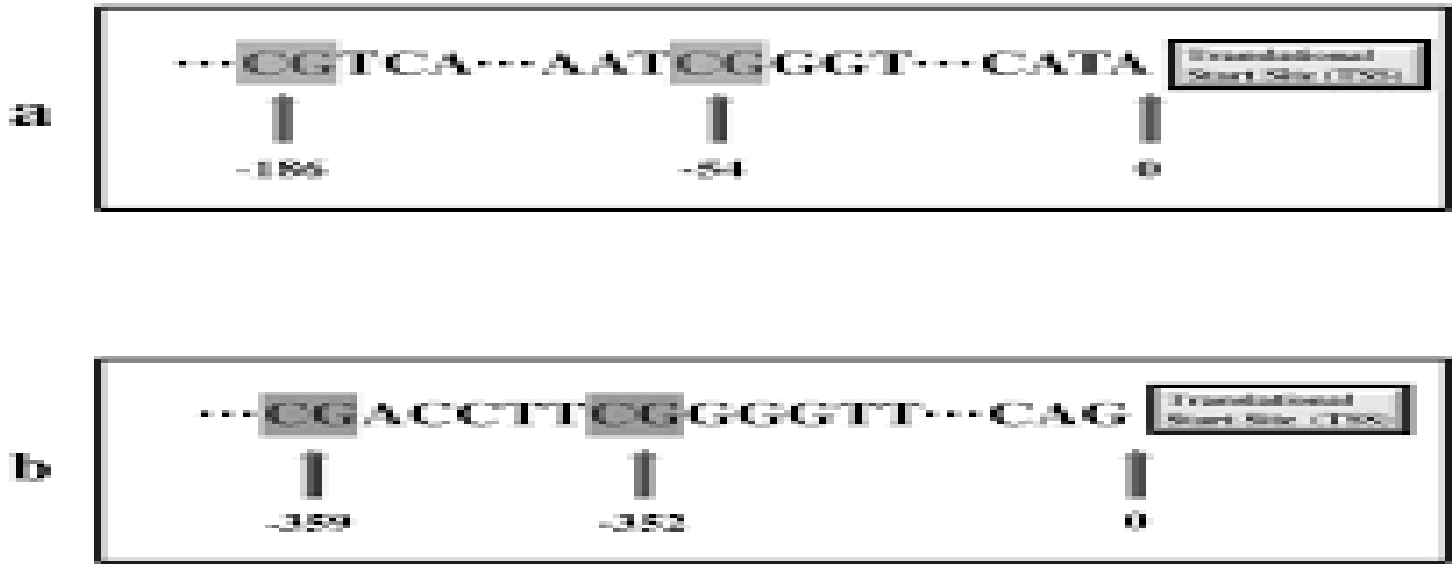
Cytosine-phosphate-Guanine dinucleotide (CpG) sites

DNA methyltransferase

S-Adenosyl methionine (**SAM**)
Is converted to
S-Adenosyl homocysteine
(**SAH**)

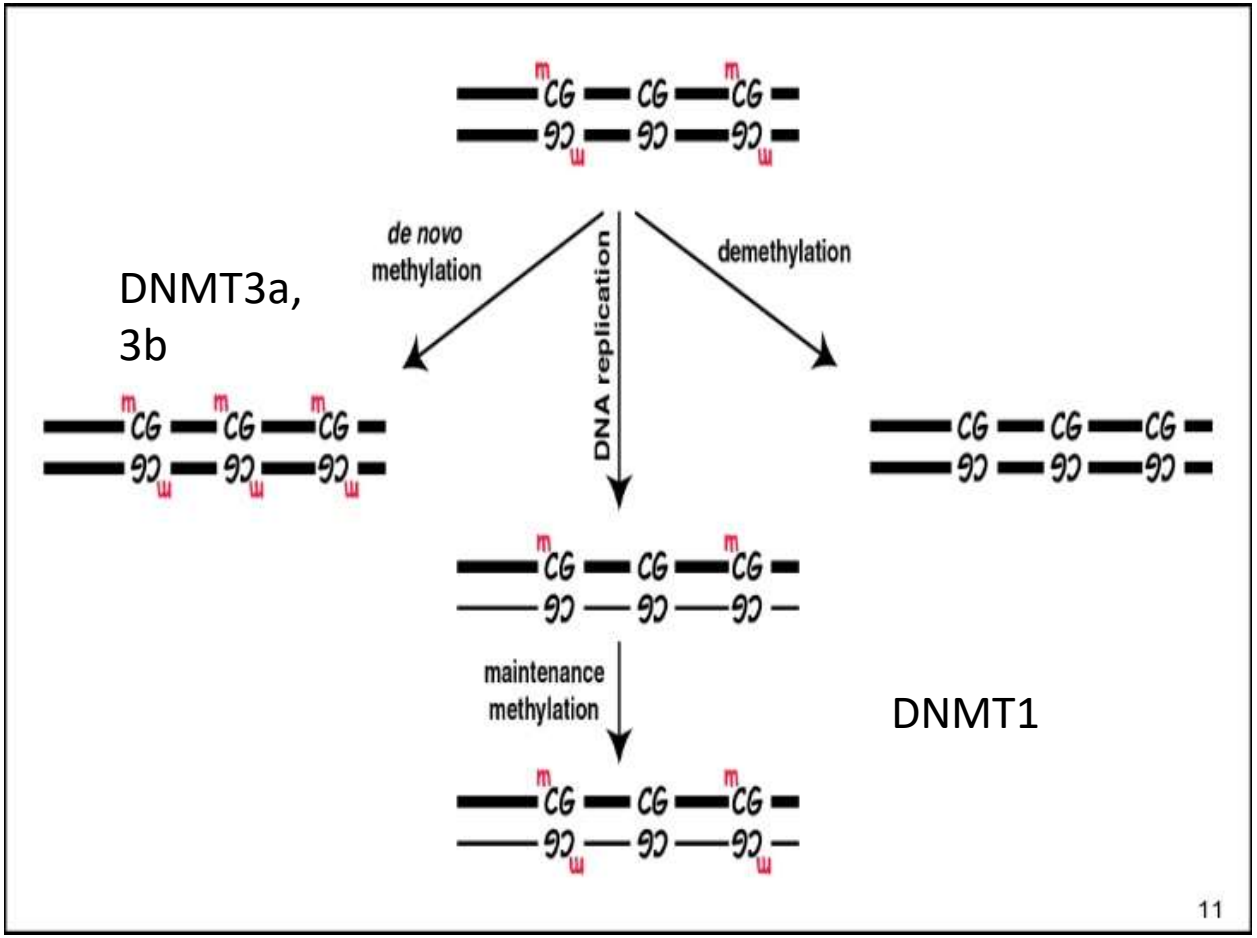


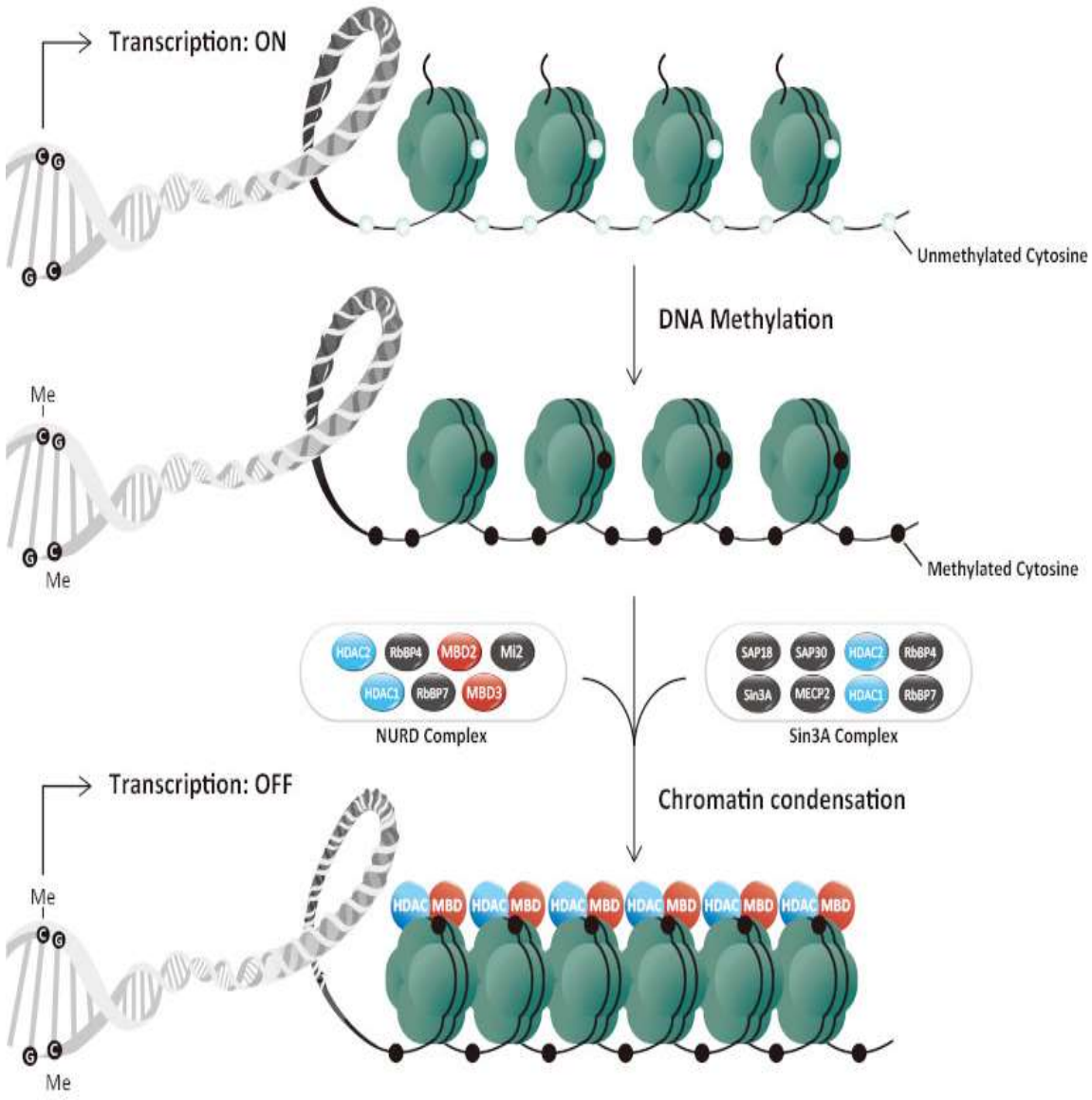
Cytosine-phosphate-Guanine dinucleotide (CpG) sites



DNA methyl transferase De nova and maintenance methyl transferase

DNMT1, DNMT3a, DNMT3b and DNMT3L




Transcription: ON
Unmethylated Cytosine
DNA Methylation
Me
Me
Methylated Cytosine
HDAC2
RbBP4
MBD2
MI2
HDAC1
RbBP7
MBD3
NURD Complex
SAP18
SAP30
HDAC2
RbBP4
Sin3A
MECP2
HDAC1
RbBP7
Sin3A Complex
Transcription: OFF
Chromatin condensation
Me
Me
HDAC
MBD

DNA methylation typically acts to repress gene transcription

Happens during embryogenesis stage

Permanent mutation of genes

Only possible epigenetic mutation at DNA