# BHARATHIDASAN UNIVERSITY

Tiruchirappalli- 620 024
Tamil Nadu, India

# Programme: M.Sc. Biochemistry

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| Course Title | : Chromatin and Epigenetics |
| Course Code | : BC205DCE |

## Unit-5
## Epigenetics and Diseases

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# Unit-5 Overview

- Predisposition to disease
- Imprinting based disorders
- Epigenetics of memory, neurodegenaration and mental health
- Kidney, diabetes and cardiovascular disorders

# Animal model for epigenetic regulation

**Why do two genetically identical mice look vastly different**

**are unavoidable for the study of epigenetics**

**birth, growth, maturation, and senescence**

**currently used animal model in epigenetics research is rodents**

**Yellow Agouti Mouse Model**

***Axin1-Fused (Axin1Fu)* Mouse Model**

**Dietary and nutritional Interventions**

**Stress induced epigenetic reprogramming**

**Environment stress**

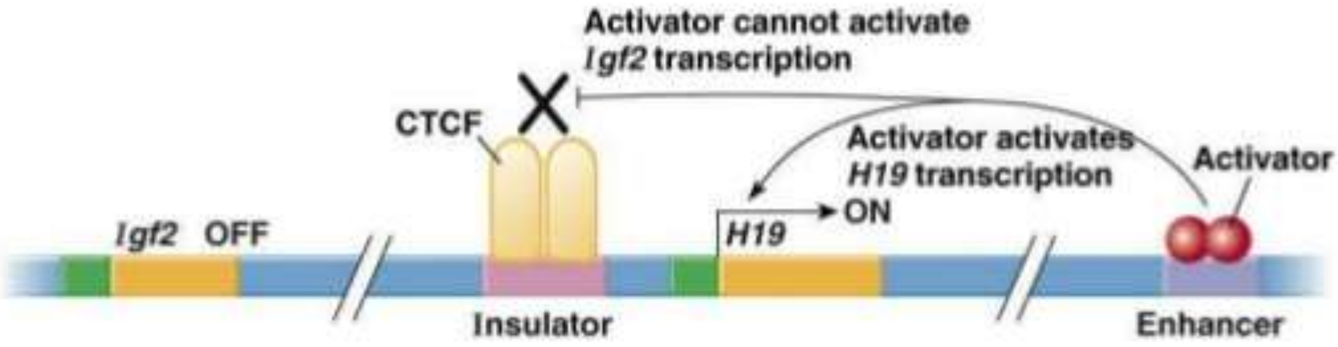
**Social and emotional factors**

**Unanticipated phenotype**

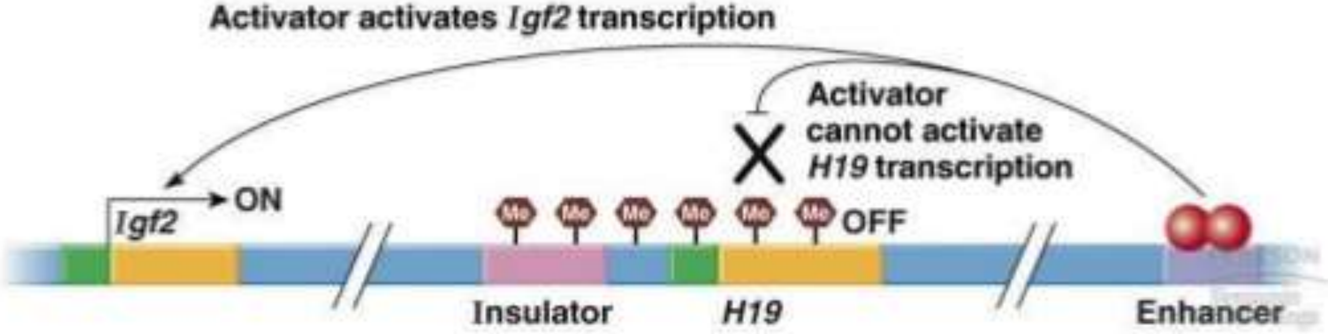
# Genomic imprinting

- Genetic material derived from paternal and maternal
- Offspring will express either paternal or maternal
- During gametogenesis only paternal or maternal alleles will be expressed.
- This process is called as genomic imprinting
- Imprinting is carried out by Epigenetic mechanism
- 1% of the entire genome

a) Maternal chromosome

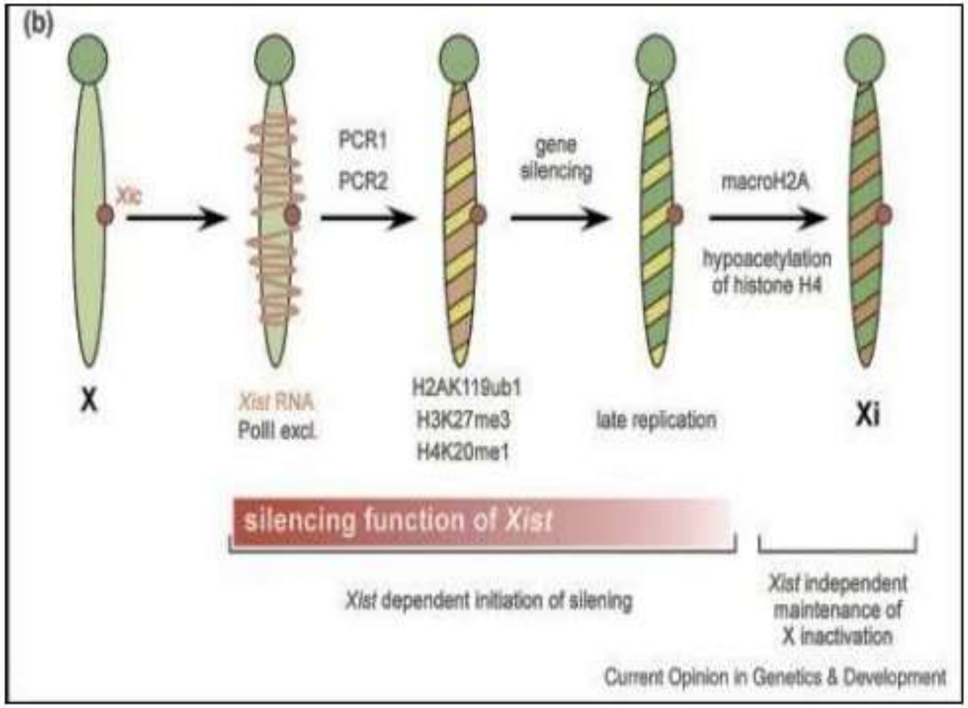


b) Paternal chrosome



# Non coding RNA

- **Random X inactivation**



Current Opinion in Genetics & Development

# Histone modification & chromatin remodeling

- Histone modifiations includes Acacetylation of lysines (HATs), Phosphorylation of serines (Kinases) and Methylation of lysines

- Methylation of lysine-4 in H3 is associated with active genes and methylation of lysine-9 in H3 is associated with inactive genes

- The allele-specific gene silencing in H19 is in part mediated by hypermethylation and histone deacetylation *(Pedone PV et al., 1999)*