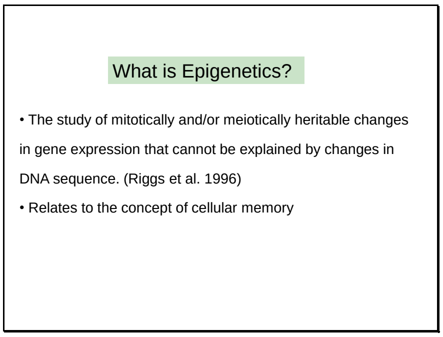
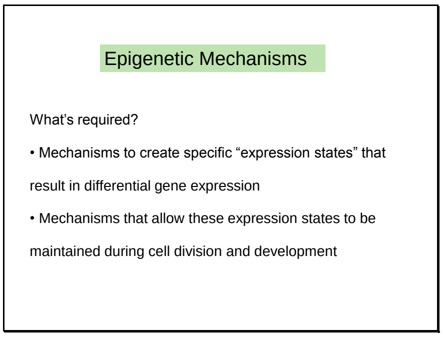
Slide 14



Examples all have in common that non DNA changes change expression and can be heritable (purists want evidence of heritability, some examples are epigenetic changes without heritability).

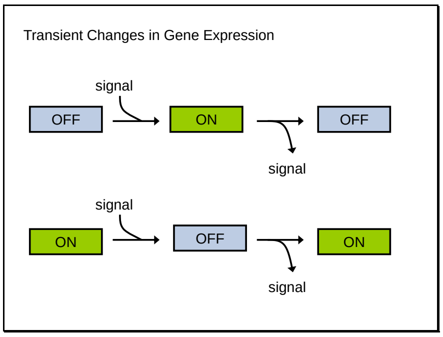
Slide 15



Read slide.
Can't just layer epigenetic marks down, they need to be inherited also.

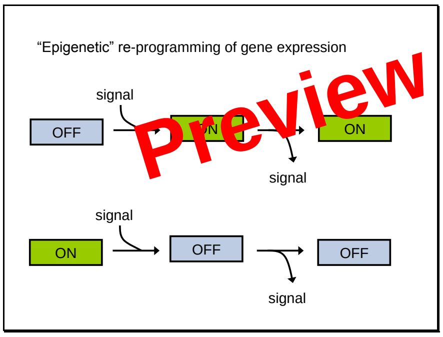
From Powerpoint:
Much of the debate regarding the definition of Epigenetics relates to the issue of heritibility.

Slide 16



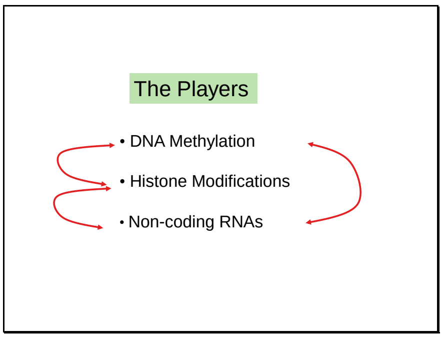
Seen in previous modules
When the signal is removed, the gene expression status reverses to its prior state (transient).

Slide 17



Whereas epigenetics reprogramming requires once the signal is removed, the signal pattern expressions stay on or off. They are stabley propagated.

Slide 18



Whats involved in these mechanisms? DNA methylation- the classic epigenetic mark. Everything influences everything. The complication in all of this is they don't act in isolation.

Not 1 single epigenetic mechanism, non-coding RNAs influencing both of these. Appreciate interplay between different marks. Theres examples where non coding RNAs are either directing the events or not involved at all.

Slide 19

Need to consider:

- How the epigenetic mechanisms influence gene expression
- Whether the epigenetic marks are heritable (mitotic and/or meiotic stability)
- How the epigenetic marks are directed to specific regions of the genome (highly regulated- esp in development)
- Biological roles of epigenetic mechanisms- are they involved in normal biological processes
- The consequences when epigenetic mechanisms fail

How mechanisms influence gene expression. What is it about adding DNA methylation marks that will switch a gene off.

Added notes in red.

Slide 20

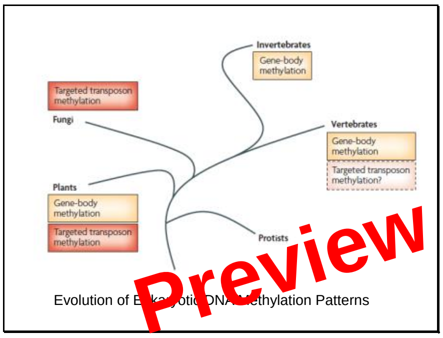
DNA methylation

- Associated with many epigenetic phenomena
- Generally associated with transcriptional inhibition (when located at promoter sequences)
- Occurs on cytosine residues in many eukaryotes
- Well studied in vertebrates and plants where it is essential for normal development

Point 2-when its located at promotor/regulated regions
Point 3- not all eukaryotes though!

In vertebrates- failure to do methylation, fail to develop very early. In plants, more survive (more developmentally flexible) but profoundly developmentally compromised.

Slide 21



Think about evolution of the methylation patterns.
Methylations two main roles: control gene expression and defence against invasive nucleic acids eg transposons.
If we look in plants, we see both genes and transposons= methylation.

The fungi who do methylate (not all), do it to suppress transposons- not to control gene expression.
The vertebrates, not all use methylation, most target the genes not the transposable elements (suppressed histone modification probably).
Plants/organisms are the most heavily reliant on methylation.

From Powerpoint:
Important to note that some invertebrates and fungi do not use DNA methylation.