- check-in
- elevator pitch (→ random choice)
  - rough draft (Sun night?)
  - methodology
- proposal

★DESEQ to Docker

Week 9

genetic mutations

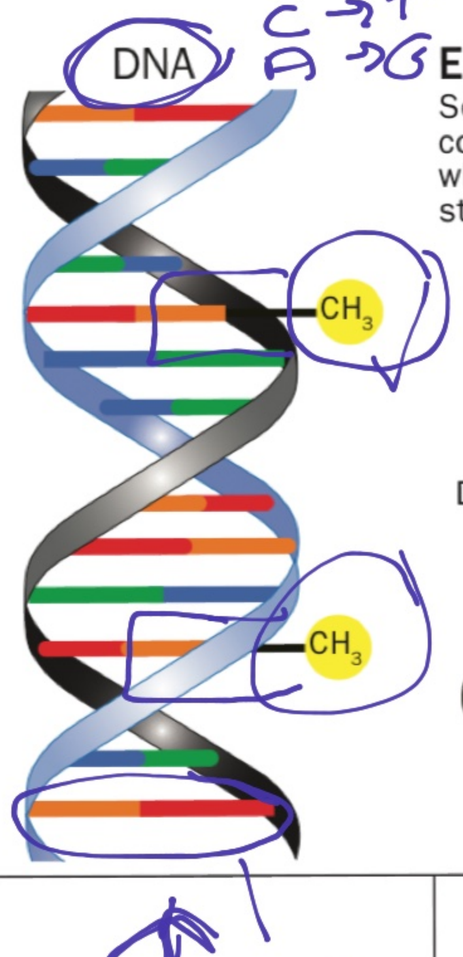
Beyond Genetics

Epigenetics is the study of certain kinds of chemical switches that turn genes on or off, thereby altering gene expression (how actively a gene is used to make protein).

Genetics

Changes in the genetic code—the sequence of nucleotides A, T, C and G in DNA—affect appearance and behavior.

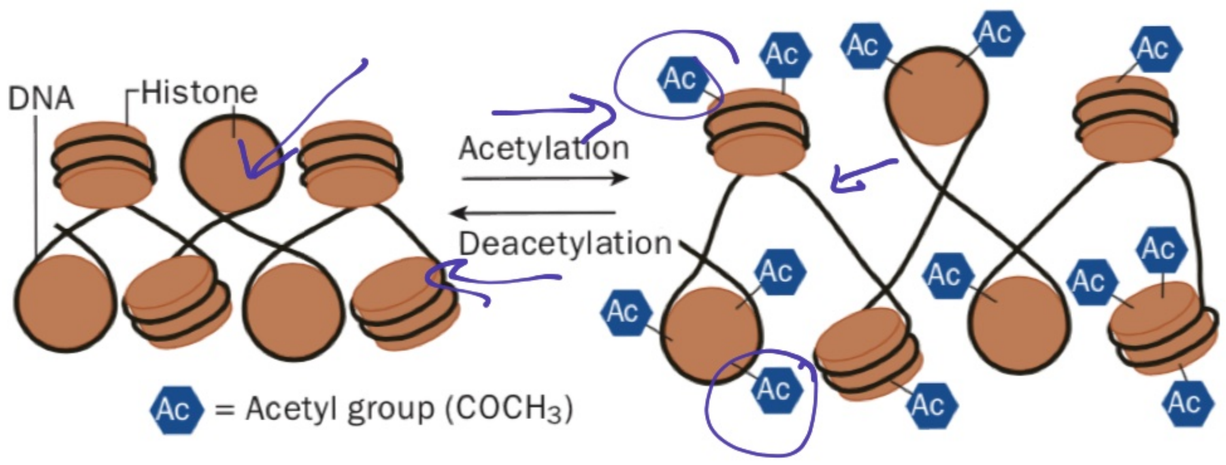
Adenine (A)
Thymine (T)
Guanine (G)
Cytosine (C)



Epigenetics

Some chemical changes alter gene expression without affecting the genetic code. For example, affixing methyl groups to DNA inhibits gene expression, whereas adding acetyl groups to proteins called histones loosens chromosome structure, making the underlying genes easier to transcribe.

CH_3 Methyl group can attach to the nucleotide cytosine

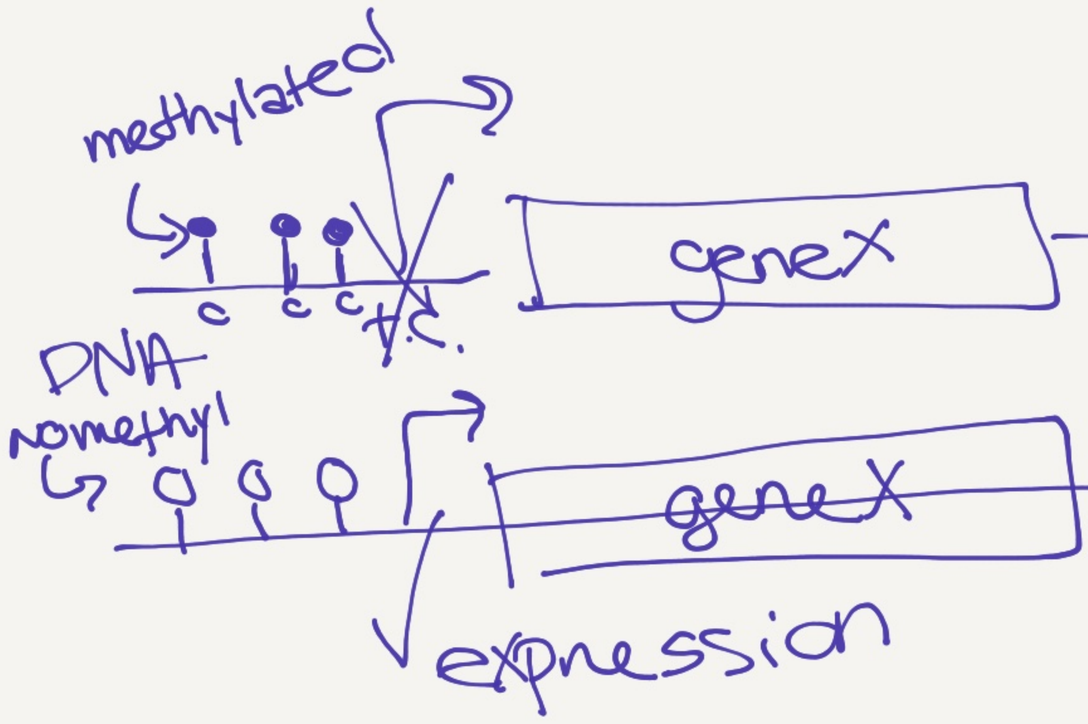


EDMUND S. HIGGINS

DNA sequence

DNA around histones tightly wrapped == ↓ expression (Transc. mach. can't get in)

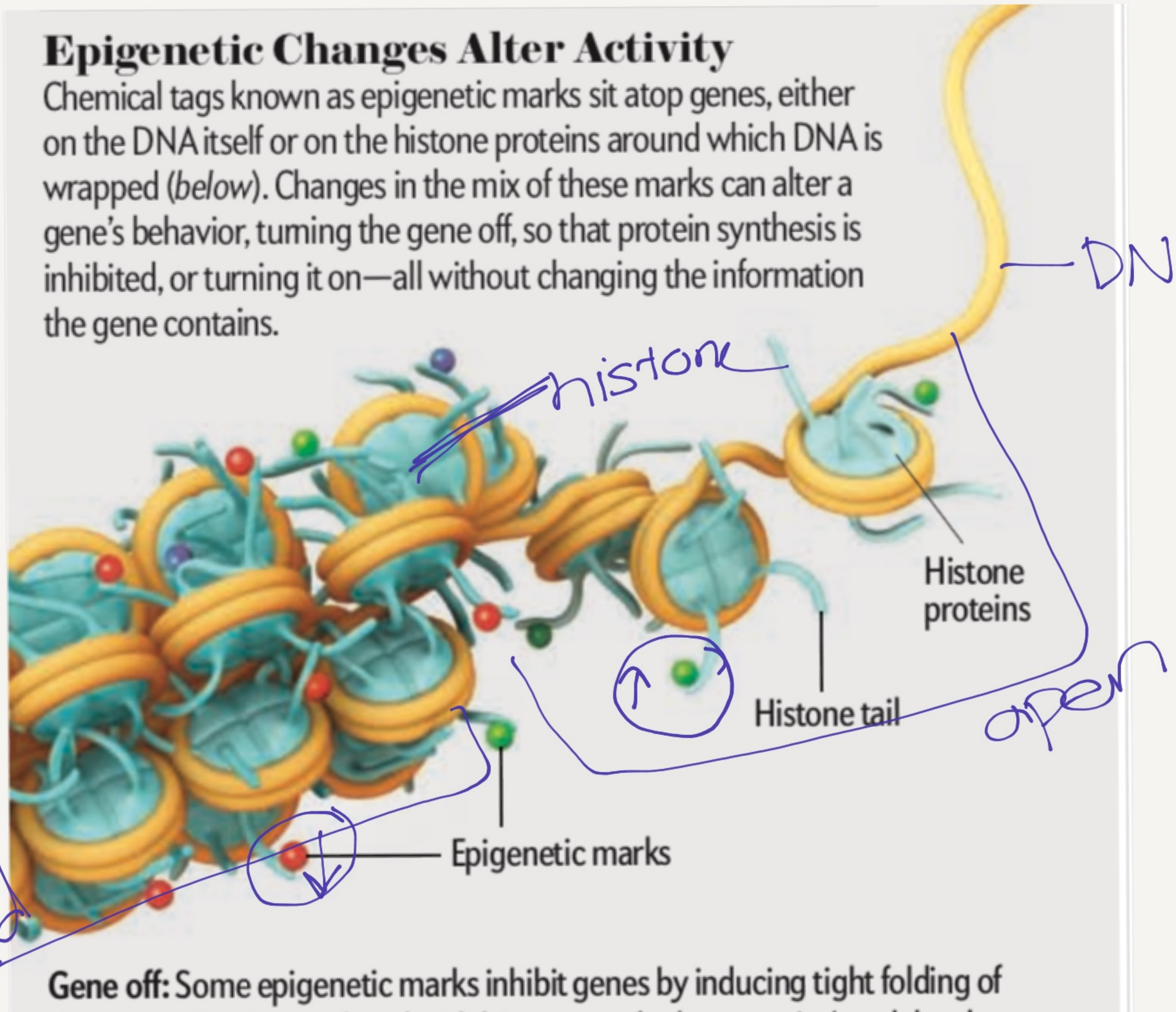
Epigenetics
1. methylation of histones
2. acetylation of histones
3. methylation of DNA (DNAm) Cytosines
4. Environment



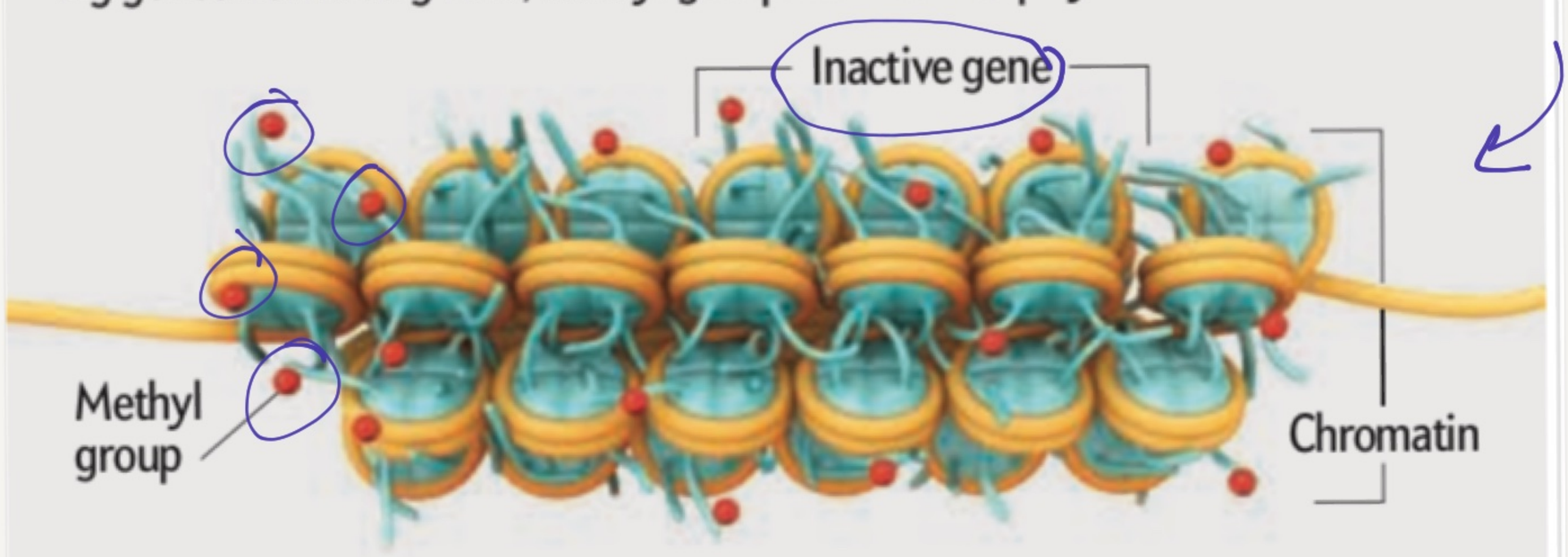
↓ X protein
√ protein

Epigenetic Changes Alter Activity

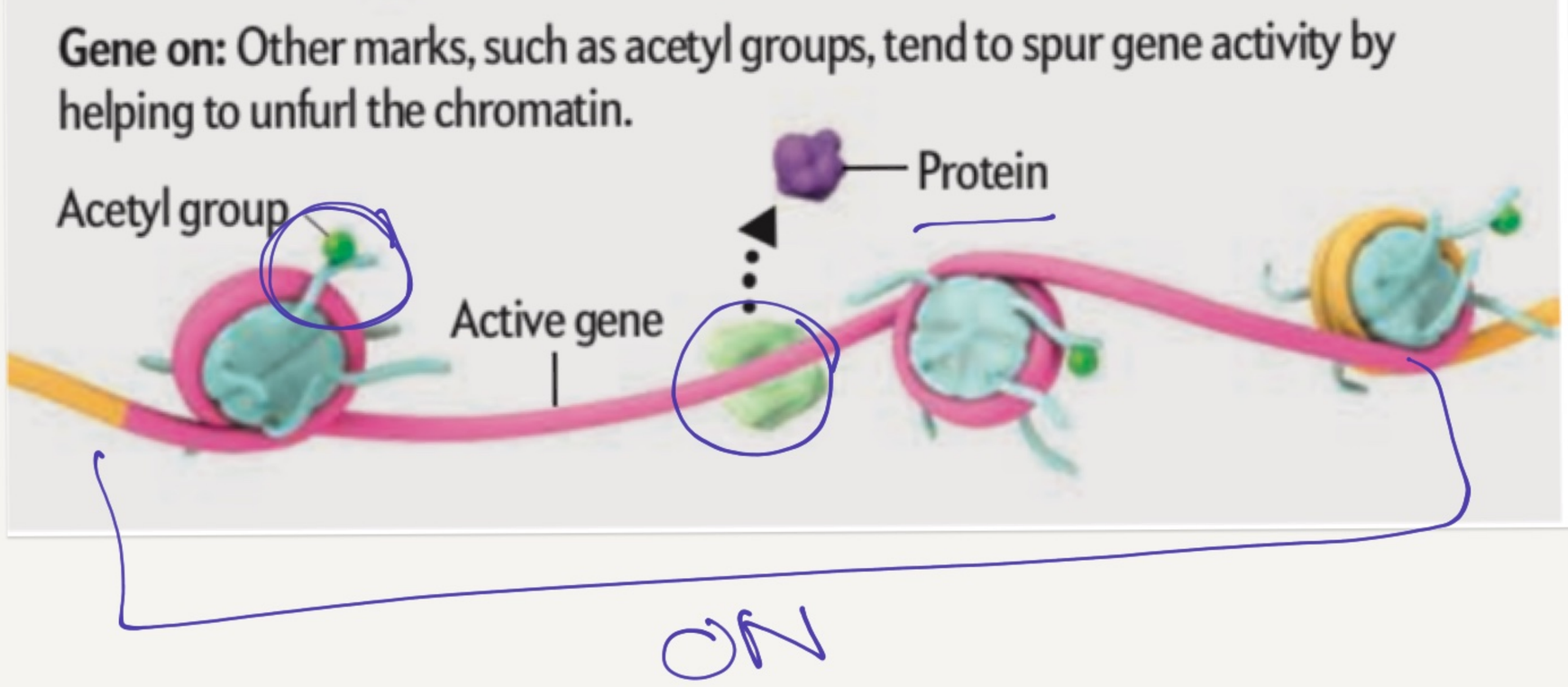
Chemical tags known as epigenetic marks sit atop genes, either on the DNA itself or on the histone proteins around which DNA is wrapped (*below*). Changes in the mix of these marks can alter a gene's behavior, turning the gene off, so that protein synthesis is inhibited, or turning it on—all without changing the information the gene contains.



Gene off: Some epigenetic marks inhibit genes by inducing tight folding of chromatin (DNA complexed with histones and other proteins) and thus keeping genes from being read; methyl groups sometimes play that role.



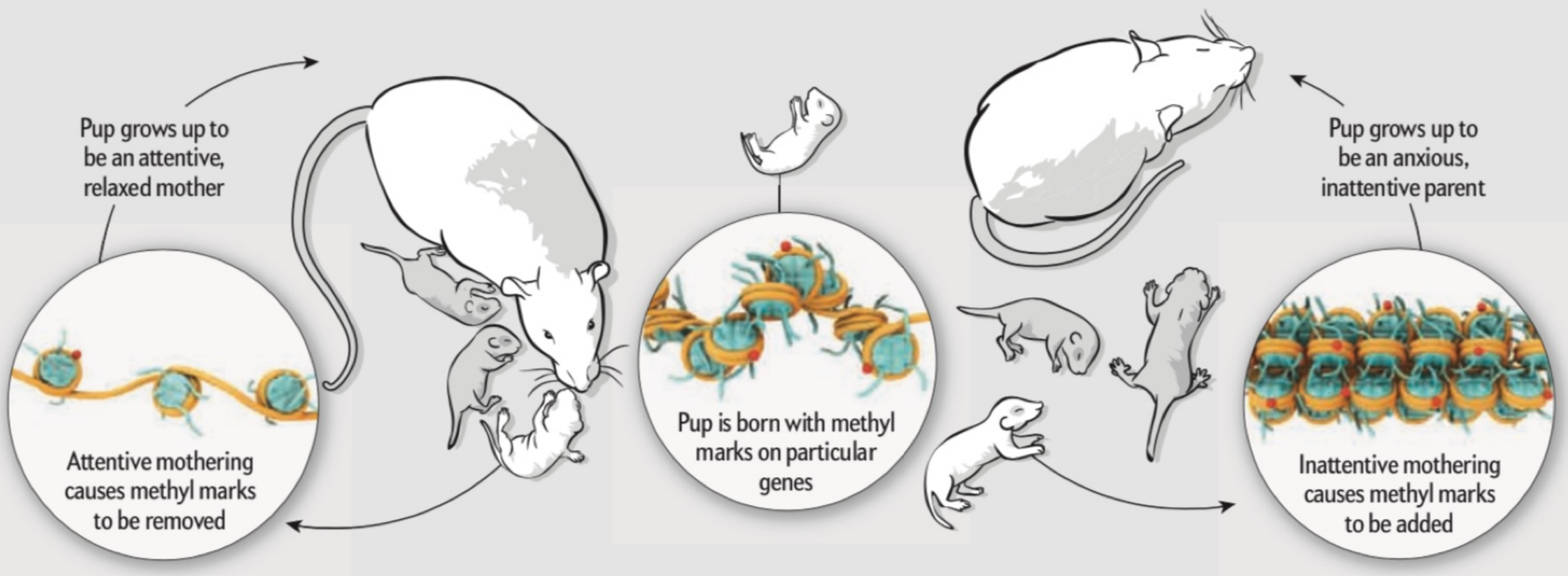
Gene on: Other marks, such as acetyl groups, tend to spur gene activity by helping to unfurl the chromatin.

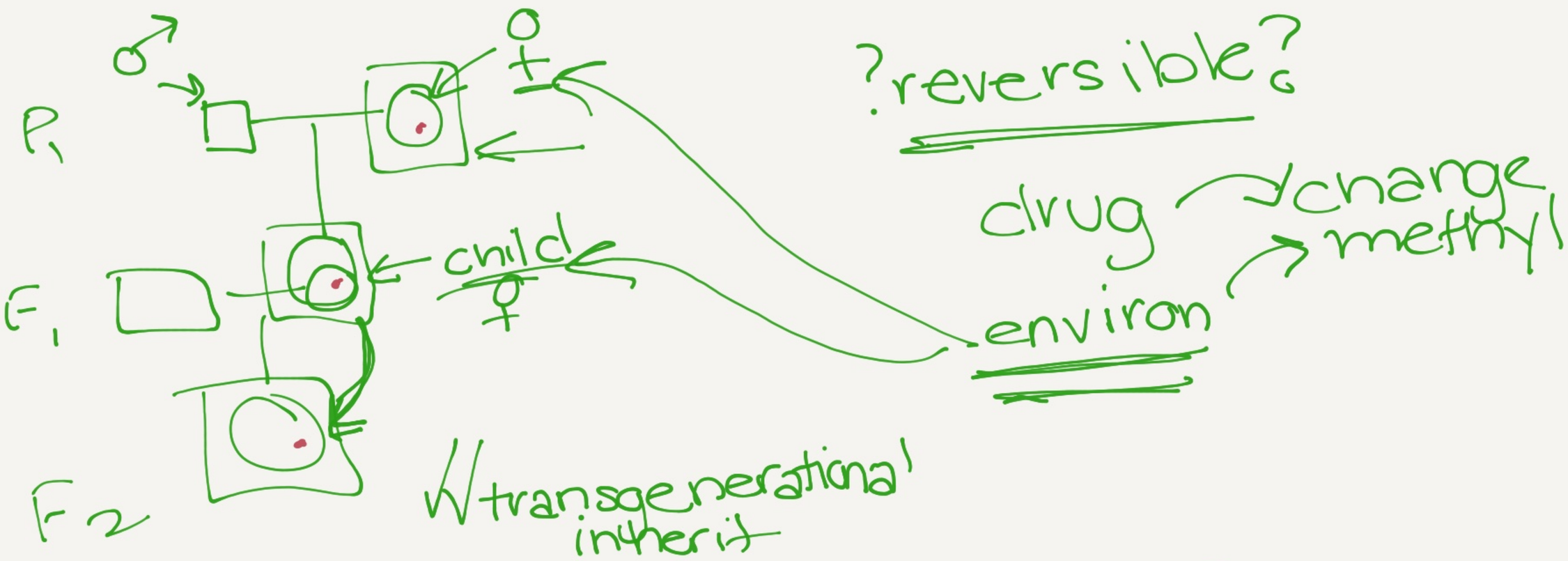


Are epigenetic alterations heritable?

My Mother, Myself

Studies in rats have shown that epigenetics can influence maternal behavior and that this effect can be passed from one generation to the next by acting on the pup's brain alone, without altering germ cells. When pups are born, genes involved in regulating the animals' responses to stress are decorated with inhibitory methyl marks, which enhance sensitivity to stress. If the pups are raised by a relaxed and nurturing mother, many of their methyl groups will melt away, leaving the animals calmer. When these pups mature, they, too, will be easygoing, attentive parents. If the pups, however, are raised by a fearful, passive mother, their genes will gain methyl marks. They grow up to be nervous and neglectful caretakers.





?? maybe some evidence