**AP Biology 12**

Genome Evolution: Chapter 21

Genome evolution is the process by which a genome changes in structure (sequence) or size over time

**Concept 4:**  Analyzing genomes and their evolution: retrotransposons, evo-devo, homeoboxes

*You Must Know*

* How prokaryotic genomes compared to eukaryotic genomes
* The activity and role of transposable elements and retrotransposons.
* How evo-devo relates to our understanding of the evolution of genomes.
* The role homeotic genes and homeoboxes

*How could so many proteins be made with so few genes?*

Only 1.5% of the human genome codes for proteins or is transcribed into rRNAs or tRNAs.  Much of the rest is**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**, sequences that are present in multiple copies in the genome.

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**makeup much of the repetitive DNA.

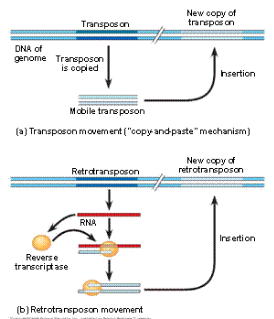
Stretches of DNA that moves from one location to another in the genome with the aid of an enzyme,**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.

Two types

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**move by means of a DNA intermediate

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**move by means of a RNA intermediate and leave a copy at the original site.  The process involves reverse transcriptase (remember this guy? Retroviruses!)

**Jumping Genes!**

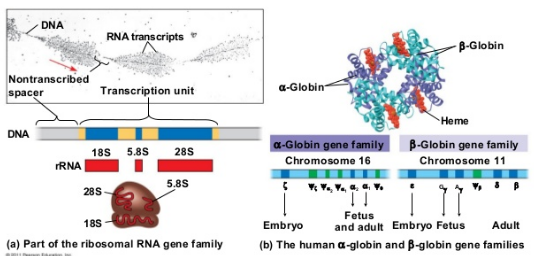


*What’s the point of transposable elements?*

Transposons can **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**function if inserted in the middle of a functional gene, or alter gene expression if inserted into a regulatory element.

While this may be harmful, over many generations some may have small beneficial effects, resulting in **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**are collections of 2 or more identical or very similar genes.

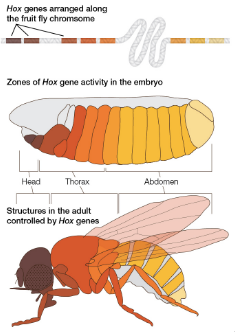


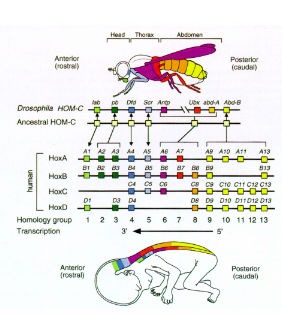
**Evo-devo**

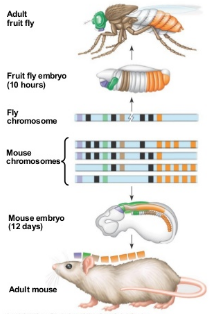
→ a field of biology that compares \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_processes to understand how they may have evolved and how changes can modify existing organismal features or lead to new ones.

**Homeotic genes**

Master regulatory genes that control \_\_\_\_\_\_\_\_\_\_\_\_\_\_and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_of body parts by controlling the developmental fate of groups of cells.







**hox genes**

homeotic genes in animal were named hox genes, short form for  **h**omeob**ox** containing genes.

A **homeobox** is a widely conserved 180-nucleotide sequence found in homeotic genes.  The sequence is***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***since it is found in many groups (e.g. fungi, animals, and plants) with very few differences.  This hints at the **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**of all life-forms.