

Review 17

Hereditary Factors:

- Where are they?** IN NUCLEUS OF CELL
- What are they?** NUCLEIC ACIDS
- How do they work?** TRANSCRIPTION & TRANSLATION
- How do they get passed on?**

RNA is intimately involved in making proteins

mRNA

tRNA

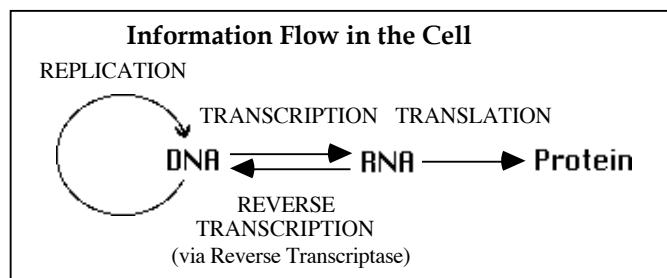
rRNA

- part of structure of ribosomes; helps hold mRNA to ribosome and some has enzymatic activity, shifting bond on amino acid in “P” position from tRNA to amino acid in “A” position

So, how does this system work?

- ① **TRANSCRIPTION** - assembly of RNA from a DNA template occurs in nucleus (where DNA is!) results in complementary copies of short region (gene) of *anti-sense (template) strand* of DNA
mRNA, tRNA, & rRNA *all from genes* in DNA
- ② **Modification of mRNA** by CAPping, adding Poly-A tail, and “pruning” of mRNA to remove introns
- ③ **Assembly of ribosome** around start end of mRNA molecule—establishes the **READING FRAME!!!**
- ④ **TRANSLATION:** assembly of protein
 - ✓ starts with first **AUG** (start codon) to right of CAP
 - ✓ adds one amino acid at a time as message moves through ribosome one codon at a time
 - ✓ ends when **STOP** codons appear

CENTRAL DOGMA of BIOLOGY



“ONE GENE – ONE POLYPEPTIDE” theory

Review 17, con't

MUTATION--any change in the nucleotide sequence of a DNA molecule
✓ usually recognized by altered protein produced by altered DNA
e.g. Sickle Cell Anemia

T to A substitution in anti-sense DNA, *resulting in* valine being substituted for glutamic acid in β -chain of hemoglobin, *resulting in* protein which falls out of solution under low oxygen conditions, *resulting in* sickling of red blood cells

✓ kinds of mutations

- * point mutations (substitutions, additions, deletions)
- * inversions
- * deletions
- * translocations
- * DNA repeats

MUTAGEN--a substance that causes a mutation to occur

✓ kinds

- * low energy radiation
- * high energy radiation
- * chemicals
- * heat

!!!BE SURE TO STUDY PAGES 63, 64 & 65 of the Lecture Notes!!!