DNA:

How is this linear information related to our inherited traits?

DNA directs our cells:

Our cells translate:

Proteins are the link between:

Why are some people lactose intolerant or turn red when they drink?

**Protein Synthesis**: (p. 192; Fig. 10.6A & p. 194; Fig. 10.8B)

Two phases in making proteins (Prokaryotic cells):

1) **Transcription**:

2) **Translation**:

Three phases in making proteins (Eukaryotic cells):

1) **Transcription**:

2) **RNA Processing**:

3) **Translation**:

REMEMBER: DNA → RNA → Protein

=> 1 gene - 1 polypeptide (protein)

NOTICE: 2 languages: nucleotides → amino acids →

How does RNA differ from DNA?

<table>
<thead>
<tr>
<th>RNA</th>
<th>DNA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sugar:</td>
<td></td>
</tr>
<tr>
<td>Nitrogenous bases:</td>
<td></td>
</tr>
<tr>
<td>Strands:</td>
<td></td>
</tr>
</tbody>
</table>

**Genetic code**: (p. 194; Fig. 10.8A)

Why does the genetic code have to be read in groups of 3's?
Codons:
found only on:
1 start codon - AUG - methionine
3 stop codons - UAA/UAG/UGA
60 codons - for the 20 amino acids

**TRANSCRIPTION**: (p. 195; Fig. 10.9A & B)
Occurs:

**RNA polymerase**: Three functions:
a) b) c)
What bonds are being broken?
(5' → 3' direction)

**Promotor region of DNA**:
Initiator site:
	Elongation:
	Termination:

**Types of RNA from transcription**:
a) messenger RNA (mRNA):
b) transfer RNA (tRNA):
c) ribosomal RNA (rRNA):

What is the complementary RNA strand that would be transcribed from the following DNA sequence?

<table>
<thead>
<tr>
<th>DNA</th>
<th>RNA</th>
</tr>
</thead>
<tbody>
<tr>
<td>5' - TACTTAAAAATC - 3'</td>
<td></td>
</tr>
<tr>
<td>3' - ATGAAGTTTTAG - 5'</td>
<td></td>
</tr>
<tr>
<td>DNA</td>
<td>RNA</td>
</tr>
<tr>
<td>5' - TACTTAAAAATC - 3'</td>
<td>____________________</td>
</tr>
</tbody>
</table>
**RNA PROCESSING**: (p. 217; Fig. 11.7)

1) Guanine cap
2) Poly-A tail
3) Introns:
4) Exons:

**Splicesome**:

**Ribozymes**:

**TRANSLATION**: (p. 198 - 200; Fig. 10.13 - 10.15)

Occurs:

**Players involved in translation**:

1) mRNA:
2) tRNA:
   functions as:
   carries:
   recognizes:
   **Anticodon**:
3) aminoacyl tRNA synthetase:
4) ribosomes:
   coordinates the coupling of:
   small subunit
   large subunit: has the 2 (3) binding sites
   a) A site:
   b) P site:
   c) E site: exit site (new site in which the tRNA in the P site enters)
3 Stages of Protein Synthesis - "The process": (p. 199; Fig. 10.13B and 10.14)

a) Initiation:
   1) Binding of:
      a)
      b)
      c)
   2) Large subunit attaches:

b) Elongation:
   1) Codon recognition:
   2) Peptide bond formation:
   3) Translocation:

c) Termination:
   stop codons (UAA/UAG/UGA):
   releasing factors attaches:

Polyribosome:

The proteins produced are in the 1° level of protein structure, which the genes determine
Some proteins are modified further before they do their specific jobs
What are some of the possible roles for these proteins?

The following tRNA has the anticodon UAC. What is the DNA base code for this tRNA? What amino acid would this tRNA carry?

<table>
<thead>
<tr>
<th>Amino acid</th>
<th>tRNA</th>
<th>mRNA</th>
<th>DNA</th>
<th>UAC</th>
<th>anticodon</th>
<th>codon</th>
</tr>
</thead>
</table>

Dictionary of the genetic code for amino acid: codons
Changes in the Genome:

Mutations:
  Could be: a) disastrous:
            b) advantageous:

If mutations occur in the gametes (sperm or ovum), then they can be transferred to offspring

Gene mutation:
Point mutations:

2 types of mutations:
1) Base substitution:
   a) could make no difference at all, why?
      GGC \(\rightarrow\) GGU in mRNA; still codes for glycine
   b) could be:
   c) could be detrimental (useless protein)
Ex. sickle cell anemia: GAA \(\rightarrow\) GUA
   mRNA (valine instead of glutamic acid)

Missense or nonsense

2) Insertion or Deletions:
   Frameshift mutation:
   This is more disastrous effect on the resulting protein than substitutions.  Why?

Viruses:
Are these living or non-living?

What is the genetic material of viruses?

Viruses are a problem to all organisms.

What is HIV? AIDS?

What type of virus is HIV? (p. 205; Fig. 10.21)

What types of cells do they tend to attack in the human body and why?