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Lecture Date: Friday, March 31, 2006

Announcements:

- There will be a quiz next Wednesday covering material from the midterm through today.
- Next Friday, there is no lecture. Small group sessions will be taking place.

I. **Translation (Protein Synthesis)**
   A. Remember that **RNA is the central molecule** here; it is an **RNA world** in which we live.
      1. **Carl Woese** was the first to sense the importance of RNA.
      2. RNA has many functions and characteristics that help to explain why it is such a central molecule.
         a. RNA is the only molecule to have both **coding and catalytic activity**.
            1) The basic catalytic action that RNA is involved in is ribosomal. In the large ribosome molecule, it is the **ribozyme** that **catalyzes peptide bond formation**.
         b. The list of RNA functions provided on the slide is actually much longer.
            1) In either case, what is present in this list suggests that **RNA functions in a very fundamental way.**

II. There are **differences between RNA translation** in prokaryotes and eukaryotes.
   A. The pre-mRNA message is quite long in comparison to the actual RNA.
      1. This pre-mRNA message is then spliced and capped.
      2. From this, ribosome result. If it is a eukaryotic organism, it is 80S; if prokaryotic, then 70S.
   B. If **eukaryotic**, there is **one gene for one protein**.
   C. If **prokaryotic**, there is a long RNA molecule that goes right into the cell membrane.
      1. It is read right away by the 70S ribosome, reading from 5' to 3' end of the molecule, where there is nitrogen at one end and carboxyl group at the other.
      2. The **operon structure** can keep making proteins. As a result, each gene can make several copies at the same time.
   D. This process costs an amount of ATP.
      1. You can think about *E. coli* when asking this question. Remember that it can double its mass every 20 minutes, and its chromosome splits every 40 minutes. It can be inferred that a lot of enzymes are needed to carry this all out.
      2. It is hard to picture this process in a eukaryotic cell. The complexity here reflects complexity of eukaryotic cells.